



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

### Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

### About Google Book Search

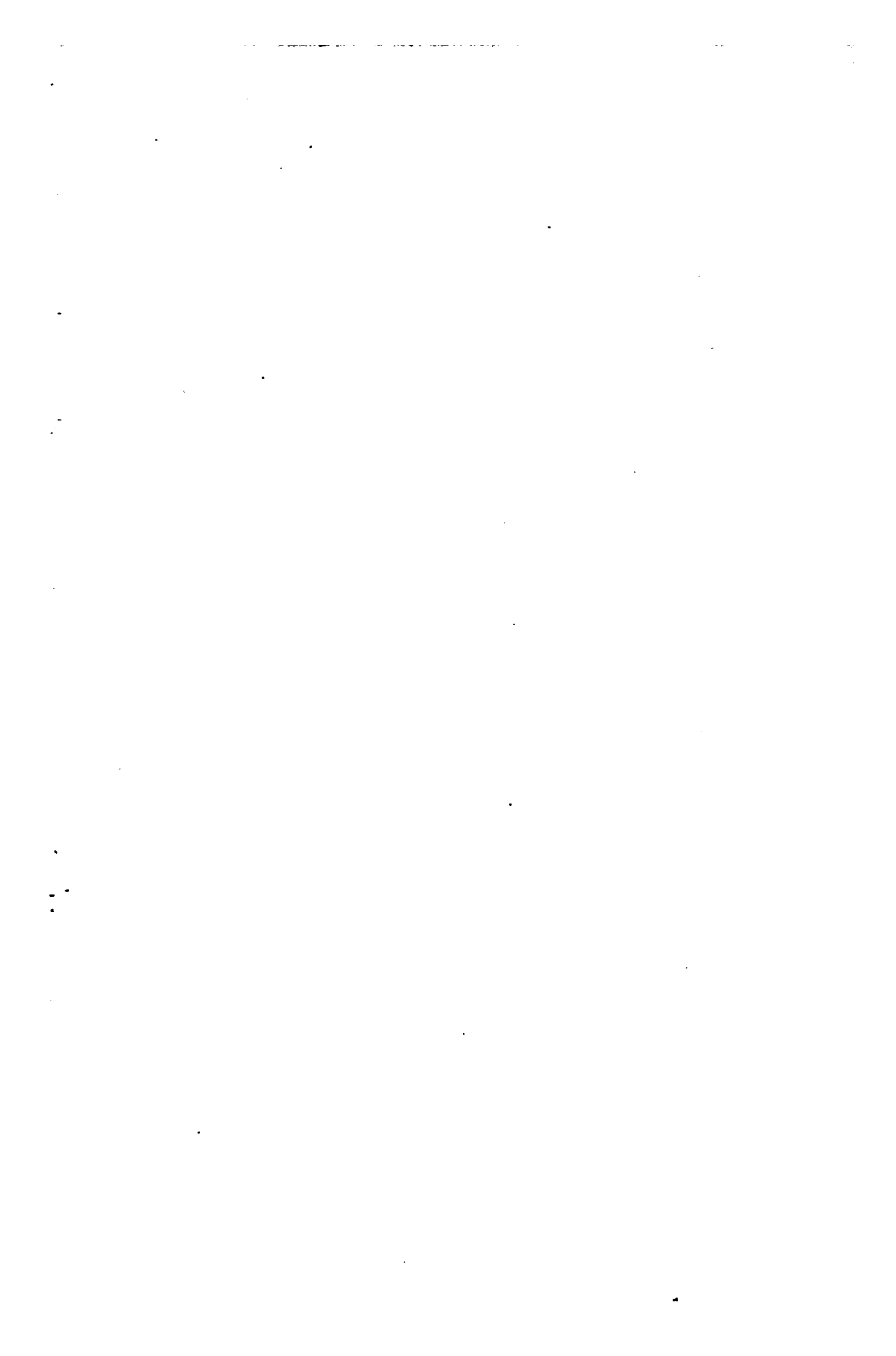
Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>

Med 5019.11.9

**Harvard College  
Library**



**Gratis**





## **EXERCISE AND HEALTH**



# EXERCISE AND HEALTH

BY  
DR. WOODS HUTCHINSON

OUTING  
HANDBOOKS



NEW YORK  
OUTING PUBLISHING COMPANY  
MCMXI

Ms. 5019.11.9

✓



*creative*

**COPYRIGHT, 1911, BY  
OUTING PUBLISHING COMPANY.**

**Entered at Stationer's Hall, London, England.  
All rights reserved**



## CONTENTS

CHAPTER	PAGE
I. ERRORS IN EXERCISE . . . . .	7
II. ATHLETICS AND THE HEART . . . .	34
III. MUSCLE MAKETH MAN . . . . .	56
IV. OCCUPATION AND EXERCISE . . . .	89
V. THE REAL DANGER OF ATHLETICS .	115
VI. EXERCISE THAT RESTS . . . . .	134



## CHAPTER I

### ERRORS IN EXERCISE

**E**XERCISE in primitive times was the price of life. It was only after we had learned to live by our wits, and exercise became a luxury, that it began to run into fads. If primitive man neglected his *al fresco* Delsartean exercises and let his muscles soften, he simply provided a tender tit-bit for some of his confreres, carnivore or cannibal. It was a case of eat, or be eaten, and his motto was: "Do it first!" The gorgeous possibilities of Power through Repose had not yet dawned on him.

In those days man didn't exercise, he just "humped"—he had to. Exercise with him was not sport, but simply the hungriest and grimmest sort of earnest. In such few games as he did play, his motto was that sometimes imputed to the football field: "Kill only when absolutely necessary; in other cases mutilate!"

In fact, primitive man, like his successor, the wage earner of to-day, indeed nine-tenths of the species in any age, always got a good deal more exercise than he cared for in the course of winning

his living, and usually much more than was good for him. The harder any given class to-day, outside of agriculture, works with its muscles, the shorter is its average life. Consequently man grew to hate exercise like every other form of that repulsive thing, work, and the first use that he has always made of the accumulation of enough money or merchandise to cover his meal tickets for a few months or years ahead has been to stop exercise entirely.

It is not so much that he loves sitting still—as a matter of fact our leisure classes waste as much energy and gray matter in devising idiotic amusements as they would in earning their living—but the pride of the thing, that appeals to him, the “ostentation of conspicuous waste,” as Zueblin calls it, the ability to show that he “doesn’t have to.” Men, when they are really alive, *hate* rest and could not be hired to go to heaven as it is usually described, or even to contemplate the idea with any great degree of toleration.

It is the looks of the thing, the contrast, that counts chiefly, and the man who, in his youth, has worked hard on the farm, or in the mill or shop is invariably the hardest man to persuade to take a proper amount of exercise in his later prosperous life. The most stubborn and indignant opponents of new gymnasias or athletic fields or public games

are the farmers in the Legislature, or the successful, "practical" men in the City Council or on the School Board, who had to take a great deal more exercise than they liked in their youthful days and have never taken any worth mentioning since.

The sternest and bitterest opposition to intelligent physical culture and rational hours of work, to the purchase of parks and playgrounds and the granting of reasonable holidays, comes from the class whose boast is that they started as barefoot country boys, who hate physical exercise of all sorts as a badge of servitude and degradation, and who propose to hug to their bosoms their hard-won privilege of "day-long blessed idleness" from muscular toil, while at the same time insisting that the rising generation shall pass through the same treadmill as they did, just as the Sophomore passes on with interest to the incoming class the hazings and other indignities which were visited on him as a Freshman.

Unfortunately, boast as we may of our superiority to country conditions, our city working hours are still determined largely by primitive farming standards, when the work needed so little brains that the only way to get ahead was to work longer hours than the other fellow. Our only principle is to put in the whole day ourselves and get as many hours of the other man's time as possible, no mat-

## 10      *EXERCISE AND HEALTH*

ter how well or ill employed. There are few things we do with so little intelligence as work. We still run our factories, shops, and offices from ten to twelve hours a day, utterly oblivious of the fact that we would do more work of better quality in from six to eight hours, by devoting the balance of the time to rational physical culture and recreation in the open air.

The unanimous experience of the entire world of industry is that the shorter the hours of work so far, the larger the output per laborer, the higher the wages, and the lower the percentage of labor cost in the product. A ten-hour day pays everybody concerned better than a twelve-hour day; and an eight-hour than a ten-hour. How much further the reduction can profitably go remains to be seen.

Yet the "successful man" element in every community has to be beaten over the head with a club, either in the form of a strike, or of factory and industrial legislation by indignant public sentiment, every time it is proposed to shorten hours and allow decent opportunity for health-giving recreation in the open air to the slaves of the mine gallery, of the shop with its human choke-damp or disease-bearing dust, of the foundry that melts human lives in its furnaces as part of the raw material, or the "stitch, stitch, stitch in

poverty, hunger, and dirt" in the garment factories, formerly known as sweat shops.

The worst error of exercise, the most dangerous fad of physical culture, is not to take enough of it, and to sneer at every form of it that does not bear the dollar mark. By one of those cynical poetic justices of Nature the very men who denounce all physical culture and recreation as fads are those who pay the heaviest personal penalty for this delusion. They use the vigor that they have gained in early youth in Nature's open-air school to chain themselves to the desk, to bury themselves in dungeonlike offices or airless work-rooms twelve or fourteen hours a day. They "feel fine" and are sure they are going to live to be a hundred, but one day, to their astonishment, a little artery, whose coat has been hardening for twenty years unnoticed, becomes so brittle that it snaps suddenly—and down they go with a stroke of paralysis, like a winged duck. It is never safe to jeer at the gods, whether the imaginary ones of Olympus or the real ones of modern science.

The men who jeer loudest at physical culture and who sarcastically advise college and high-school students, ambitious for gymnasias or athletic fields, to "go and git a buck saw and a cord of wood," or a hoe and a potato patch and develop their muscles "like I did when I was a

boy," are the very ones who die suddenly when they should be in their prime, for lack of exercise and open-air recreation. It is really an astonishing thing how many giants of industry and transportation, particularly executive railroad men, die, or suddenly go to pieces, between fifty and sixty years of age. It is a common saying in railroad circles that a big general superintendent, or department chief will seldom live beyond forty-eight to fifty-five years of age. Many break down before that.

It is usually supposed to be due to the way they work. It isn't; it's the way they don't exercise and utterly neglect sane, wholesome, restful recreation in the open air. These men have acquired a temporary surplus, so to speak, of reserve energy and working power by vigorous and strenuous muscular effort in their early days. After they "arrive," they work sixteen hours a day, using up their surplus, and in from twelve to eighteen years it is gone. Their body bank has been carrying them on overdrafts for the last six years. Suddenly it refuses further credit and down they go! When the sanatorium doctor, or the undertaker, picks up the pieces, he discovers that they have taken no exercise save with their teeth, or vicariously, by watching other people do it, for ten years past.



This is the class of men that appear to lend credit to the lying old proverb about those who "dig their graves with their teeth." As a matter of fact if the "hang-over" of their early outdoor lives hadn't enabled them to eat enormously without taking exercise, they would not have lasted nearly as many years as they did.

Indeed, the most dangerous feature of fads in physical culture is that by their narrowness and injudiciousness *they prevent you from getting enough of it!* We doctors feel toward physical culture and outdoor exercise pretty much as the great preacher Spurgeon did about giving.

He was talking one day to an audience of ministers and urging them to get their congregations to give liberally to missions, churches, education, etc.

"But," said one of the young men, "isn't it possible for a church to give so much that it will have nothing left for itself and go to pieces?"

"Well," said the great divine, "that might happen, but if you ever hear of a church dying because it gave too much, just send for me and I'll come and preach its funeral sermon free of charge, and my text will be 'Blessed are the dead that die in the Lord!'"

There are those who injure themselves by too much and too strenuous physical culture, but they

## 14      *EXERCISE AND HEALTH*

are comparatively few and far between. Ninety per cent of the fads act in just the opposite direction by deluding us into the belief that we can get all we need for a day in two or three doses of seven and a half minutes each. Almost the only serious or lasting harm done by excesses in exercise is among young, growing boys held to the stopwatch and trained to run for prizes by that curse of modern athletics, the professional coach, or the professional trainer, among champion athletes, and in the case of the small percentage who go into training or competitions when their hearts and lungs are still weak after an illness, especially an infection, even if only of the grippe.

One of the most foolish and prevalent fads in physical culture is the "tabloid" delusion—the idea that you can concentrate the essentials of a day's exercise into about ten or fifteen minutes of "predigested" whizzing with dumb-bells or pumping with somebody's "*Extrasizer*," as *Morris Mowgileffsky* calls it, usually advertised under such headings as "Health and Long Life for \$1.35"; or, "The Secret of Vigor in your Vest Pocket"; or "A Gymnasium in a Clothes Closet"; illustrated by a picture of some hippopotamus of a creature, whose muscles have broken out all over him and who in his sworn testimony assures you that with this system alone he has built himself up

to his present elephantine proportions from a spindling, narrow-chested consumptive! The bare possibility of ever coming to look like such a monstrosity would send a shudder down the spine of any rational being, but the "*Extrasizer*" sells like the proverbial "hot cakes."

The "business," so to speak, of exercise for the brain worker or indoor man or woman is to pump the blood through the tired brain and little-used muscles, wash out their fatigue poisons, burn up clean the wastes of the food necessary to supply working power, and get rid of all these through the lungs, the skin, and the kidneys. This process takes hours every day instead of minutes, and you can no more accomplish it in two or three ten-minute periods than you can keep up your working power on three tablespoonfuls of patent, pre-digested humbug in place of three square meals. Moreover, the only place to get rid of these waste poisons adequately from lungs and skin is in the open air. The "sweat of thy brow" is literally the price of life as well as of bread.

Even with a life spent constantly in the open air, these poisons accumulate one-fifth more rapidly than they can be got rid of, and it takes eight or ten hours' sleep every night, with muscles and brain at rest, to restore the balance.

How utterly preposterous and impossible that

## 16      *EXERCISE AND HEALTH*

this daylong process should be carried out, or even distantly imitated, in two or three five minute periods of calisthenics or deep breathing indoors! We might as well try to kill a tiger with a squirt-gun, or, in the words of Lewis Carroll, to capture the Snark by

Threatening its life with a railroad share,  
And pursuing with smiles and with soap.

There is, of course, no question that ten or fifteen minutes of vigorous arm-swinging, windmilling, back and body straining, and side-stretching are an admirable introduction to the day's work just after the bath, or a good preliminary to restful sleep, just before retiring, but they are no more to be considered a genuine substitute for a day's exercise, the amount needed to keep you in health, than the cherry in a cocktail is the food equivalent of a pound of beefsteak.

Exercise in such doses is little better than cough drops for a consumptive, which delude him into the idea that he is doing something to save his life by relieving a few of his most uncomfortable symptoms, but do nothing whatever to cure his disease. Exercise to do any genuine or permanent good to health must be taken by the hour and not by the minute. And the hours that we spend in this way

are not wasted, but the best investment we can possibly make of the time.

No man of affairs, however important or over-driven, can ever be too busy to take time for exercise, unless he wishes to apply for his Long Vacation a decade or two earlier than is necessary. The place where the Mummy of the Egyptians should be carried round at regular intervals, with a reminder that he has been dead for ten thousand years, is not at feasts, but in our business offices, workshops, counting-houses, and studies. There is where men are really killing themselves, instead of in their sports, their luxuries, or even in their vices. Commercially, slave-driving your body and brain may sometimes be a necessity, but the unbiased biologist of the twentieth century is beginning to suspect that the praises of industry, like those of sacrifice, are sung most loudly and insistently by those in church or state who hope to profit by it—in others!

It is interesting to study the genesis—I had almost said apotheosis—of an apostle of physical culture. Like every other genius, he is born not made. If he be a male; the innate qualifications that he requires are an abnormal development of one or more groups of muscles and a genius for advertising. If he have the former without the latter, he simply becomes the prizefighter, the

baseball player, acrobat, or other form of professional athlete. In that case, when people ask him "how he does it," he simply and truthfully replies that he doesn't know, he was born with the "gift."

If he has the secondary qualification, and fortunately for the community not more than one in a thousand has, he begins to look wise and impart his secret of success at so much per impart. He hires a press agent, or if he has the brains, starts a magazine and becomes his own. Being blissfully ignorant of even the rudiments of physiology, hygiene, dietetics, or the science of muscular development, his scheme of physical culture usually consists either of advising his admirers to follow his own admirable personal habits of eating, drinking, sleeping, and exercising—good or bad as these may happen to be, or else of delivering some string of absurdities that he has culled out of almanacs, "Every Man his own Doctor," the writings of his predecessors, or the maxims of the circus tent and his "trainer."

Such physical powers as he possesses he was invariably born with, though he may have improved upon them by devoting his whole mind to the business. In fact, he is what the biologist calls "a sport" and the man in the street a "freak," and anything but an ideal of balanced, symmetrical, enduring, physical development, let alone mental.

Yet the gaping public is induced, by the exploitation of his triumphs and the free use of his pictures in every imaginable peacock pose, showing his contorted muscles and his pithecoïd profile, to buy his apparatus, purchase his "secret," or take his course in calisthenics, in the blissful belief that by so doing they will become like him. So far as the value of their systems can be judged by their effect upon themselves, the cold statistical facts of record show them to be, in the language of the insurance companies, "exceedingly poor life risks." Few of them live to be over fifty. One of the best and most rational of them died recently at the age of fifty-three, after some six or seven years of chronic invalidism.

Like champion athletes of all sorts, they resist the attack of acute diseases, like tuberculosis and typhoid, badly, far worse than the average man, and are about as deplorably unsafe guides and examples for the rising generation as could well be imagined. The unbalanced character of their "systems" is further illustrated by the fact that normal, sensible individuals find out their absurdities and give them up in disgust after a few weeks' or few months' following. Only those who are themselves slightly unbalanced, either mentally or physically, persist in them. To paraphrase the old European proverb, "Scratch a Russian and

you will find a Tartar," scratch a health crank and eight times out of ten you will find an invalid, whether his fad be exercise, diet, clothing, or chewing. Nine-tenths of all individuals who subsist on exclusive diets and who live by rule are physically or mentally defective and will remain so as long as they stick to their fads. The capacity for fads is, in fact, a sign of abnormality.

If the apostle of physical culture be of the female sex, her performances are far more artistic and graceful, but equally amusing. Like her male counterpart, she is born with a beautiful face or a graceful figure. If she has the average endowment of brains she utilizes these to make a brilliant marriage, but if a little more or less or a little different, she begins to pose like the champion strong man, only far more gracefully and artistically, and to tell others "how to do it." The silly little canary bird things that she tells them to do in the way of dieting and thinking high thoughts, and going without corsets, or walking barefoot in the dew, or living in Harmony with the All Good, or crawling like the lizard, or hopping à la Kangaroo, have no more to do with her complexion and her figure than postage stamps have with the spots on the sun.

She is just as blissfully ignorant as her male counterpart of anatomy, physiology, dietetics, and



the laws of health, but she knows she can count with equal certainty on the boundless credulity of her sisters, who are less richly endowed physically, but more so financially. They take their coffee, without cream, or their cream without coffee, their ten drops of violet cologne upon lump sugar, or their deep, downward breathing with an upward thought; they contort themselves over their bed rails, or writhe over their boudoir floors, or dislocate half their joints in Delsartean poses, or work themselves into neurasthenia trying to acquire Power through Repose and practicing the Gospel of Limpness. They end with exactly the same unroseleaf-like complexions and unchorus-girl-like figures with which they began, but hope springs eternal and they are always ready to swallow a new bait, undiscouraged by past failures and pathetically sure that this plan will prove the real secret of beauty.

If anyone would take the trouble to follow the lives of these prize beauties, they would find that, with a few lamentable exceptions, they grow old and go to pieces, by either the fat or the fibrous route, from five to fifteen years earlier than the average. The one thing that kept them before the public eye was their beauty or their figure, and when that is gone they are promptly forgotten, new favorites take their place, and a new genera-

tion of gaping gullibles are ready to swallow their claims.

Any system of physical culture which does not include at least from two to four hours' gentle exercise a day in the open air, three square meals, and nine hours of sleep is of the Evil One. So far as it passes itself off as a substitute for real exercise and fresh air, or encourages you to neglect these, it is a fraud and a failure. Practically nine-tenths of all the advertised systems must be put down in this class.

Another thing which, though helpful and invaluable in rational doses, may easily be made a fetish is machine-made exercise. Any exercise which has to be taken with an apparatus should be regarded with suspicion. At best it is only a supplement to, or temporary substitute for, real exercise. In the gymnasium and under the eye of the skilled physical director, chest weights, rowing machines, bars, ladders, etc., are of the greatest value in building up groups of muscles or regions of the body which are deficient or below the general average, and in filling in the gaps between different kinds of outdoor sports, or serving as a substitute for these in inclement weather. But as they are apt to be used by the average man or boy at his own sweet will, in his own chosen odds and ends of time, they may easily do as much harm as good.

Particularly is this true from the fact that by means of them we are enabled to concentrate our exercise so far as to do a given amount of muscular work, which in any ordinary form of outdoor exercise or sport, short of sprinting, would be spread out over three-quarters of an hour or an hour, in fifteen or twenty minutes, the notion being that if you make your muscles do a certain amount of work this is all that health requires. This, of course, is utterly fallacious for the reasons already given, since the real value of exercise consists in increasing the elimination of waste poisons through the lungs and skin, and not in increasing their formation.

What the average business man or office worker is doing when he rushes through his gymnasium cyclone-fashion, chins himself fifteen or twenty times, pumps on the parallel bar, or swings on the horizontal bar for five minutes, smashes the medicine ball back and forth, hammers himself purple in the face on the punching bag, runs ten times around the racing gallery, and takes a hot shower bath and a rub-down all in eighteen and a half minutes, is simply loading himself to the bursting point with the fatigue poisons of muscular effort and allowing no time for their elimination. He came to the gymnasium from his office with his blood loaded with the fatigue toxins of brain

work. He adds to them an additional amount of the muscle fatigue poisons and goes on his way rejoicing, both barrels loaded with carbon dioxide, instead of one as before.

When it is added that most gymnasia, except a few rare ones belonging to some university or big club, are as innocent of ventilation as a Turkish bath and as fragrant as a livery stable with human steam, it can be seen what a broken reed this kind of gymnasium work is as a substitute for healthful exercise.

No one is more keenly awake to the dangers of ignorant, unskilled use of the gymnasium and its apparatus than are the splendid group of broad-minded, scholarly, scientifically trained men who are growing up as physical directors of the great gymnasia and training schools attached to our colleges, universities, Y. M. C. A.'s, and municipal and military organizations. Such men as Sargent, of Harvard, who has done such magnificent pioneer work in the cause of rational physical education and race-building, Seaver, of Amherst, MacKenzie, of the University of Pennsylvania, Meylan, of Columbia, Gulick and Crampton, of the public schools of New York, have been insisting for years that the real field of training is the heart and the nervous system rather than the muscles; that all forms of athletic exercises, to be

of permanent benefit, should be carried out as nearly as possible in the open air; that we should develop and use muscles as nearly as possible in the directions and group movements for which they are naturally used; that consequently the most profitable and helpful exercises are those which are instinctive in the individual and hence partake of the nature of free play; that the only forms of exercise to which the subject can be induced to devote sufficient time and make a daily or weekly habit for life are those which are agreeable and attractive in themselves and also partake of the nature of play.

It is most interesting to note how in all the great systems of physical culture, even in those which, like the German turners founded by Jahn, or the equally famous Swedish system of Ling, made the gymnasium the very foundation stone, it is coming to occupy a less and less important and dominant place. In fact, the modern exponents of both these great systems make games and sports in the open air the central part of their scheme and the gymnasium only a supplementary one. This is, of course, practically the position which the great English open-air methods of physical training have instinctively assumed from the beginning.

Another fad of physical culture which, though

beneficial in moderation, falls far short of the claims made for it is deep breathing. Air is, of course, the breath of life, and as this breath of life is "eaten" with the chest, the larger and more superbly expanded chest you have, the more life you get; so runs our popular logic. Moreover, it can be demonstrated easily that when you have been cramped up over desk or book for hours, it is an inspiring and exhilarating thing to stand erect, throw back your shoulders, and draw three or four big, deep breaths. Ergo; if a little of this pouter-pigeon performance is good, more of it must be better.

Also the typical consumptive has, as everybody thinks he knows, a small, flat, hollow chest and the less you are like a consumptive, the more likely you are to be a Hercules! Therefore breathe deep, fill your lungs with fresh air and your mind with pure thoughts for as much as five minutes at a stretch, two or three times a day, and you have done all that is required to attain the ineffable.

But while deep breathing, like deep drinking or high thinking, is an excellent thing in itself, it has certain limitations. In the first place, as usually practiced, it is like most of the other physical culture fads, a ridiculous subterfuge—almost a fraud. It attempts to atone for hours

of cramped, inadequate breathing in foul, overheated air by a few minutes' vigorous chest-pumping. No man or woman can breathe adequately and properly when sitting still. It is only when moving about and gently exercising, or lying prone with every activity of mind and body at rest, as in sleep, that as much oxygen is taken into the body as is burned up in it. It is the old absurdity over again of trying to atone in fifteen minutes for the neglect of a day.

The next cold, indigestible fact is one which is not so generally known, and that is that there is no more benefit in having an unusually large lung than there is in having an extra big stomach. It isn't the size of your lung or your stomach that counts, but the amount of it you use, and the way in which you use it.

Careful measurements of the height, chest diameters, and lung capacity of consumptives have revealed, what is at first sight an incredible fact, that instead of having smaller lungs in proportion to their height and weight than normal individuals, they have *larger* ones; that they give off more carbon dioxide and take in more oxygen in proportion to their weight than do healthy individuals; that the tubercle bacillus finds its most frequent lodgment in those parts of the lungs which are most poorly supplied with blood, viz., the

apexes; that surplus lung tissue is like any other surplus in the body—"matter out of place," viz., dirt, and like dirt everywhere, a splendid breeding place for disease.

What the consumptive needs is not more lungs, still less more air in them, but *more blood* in them—enough to "go round" and keep every air cell alive. Exercise and food will prevent consumption, food and exercise will cure it.

Deep breathing some years ago was universally advocated as a curative measure in consumption; now it is well-nigh discarded, only a few enthusiasts insisting upon it. All careful observers are agreed that in the acute or active stages of the disease it is distinctly harmful instead of beneficial, irritating the inflamed lung, breaking up the adhesions with which Nature is trying to wall off the disease, provoking hemorrhages, and throwing fresh doses of the infection into the blood. It is now used only in the late stages of the cure after all active processes have ceased, and only a minority of clinicians claim any special benefit from its use. The best "deep-breathing" exercises for the convalescent are walking and hoeing.

Last and most fundamental of all, the amount of oxygen absorbed by the body is not in proportion to the amount in the lungs, but to the



oxygen-hunger of the blood. Our real breathing is done by the blood, not the lungs. Air in the lungs is like food in the stomach, of no use to the body till it is absorbed. This oxygen-hunger of the blood can be produced in health only by exercise, or in diseased conditions by fever. Therefore the best method of developing the lungs is to exercise all the muscles of the body and thereby throw quantities of waste into the blood stream and raise the oxygen-hunger of the blood. The muscles that best develop the chest are those of the legs, because they are the largest masses which can be most vigorously and protractedly exercised. Simply pumping up the chest by forced inhalations is of no benefit whatever, from the point of view of oxygenating the blood, except in so far as it gives exercise to the muscles of respiration. But these all taken together have scarcely the vigor and effect of one biceps upon oxygen-hunger.

So far, in fact, from our being able to get more oxygen into the blood by pumping air into our lungs, careful experiments have shown repeatedly, these twenty years past, that the actual tension of oxygen in the lungs, even in the poorest and flattest chests, is nearly three times as great as is needed to supply the demands of the blood. This is why all our machines and cylinders for

---

the artificial administration of oxygen, or for the pouring of oxygen or ozone into the air of living rooms, have been almost abandoned, as they simply add to the air an element of which it already contains more than twice as much as the lungs are able to utilize.

To paraphrase the proverb: "You may lead a horse to water, but you cannot make him drink," you may balloon your lungs with air to the bursting point, but you cannot make the blood in them drink more than it is hungry for. The only way to build up the lungs is to build up the whole body. The "business" of the lungs is to bring the air and the blood together. The fuller you pump them of air the more you empty them of blood, and as the resting lung contains at least twice as much air as the blood in it can utilize, the way to increase its power is to *fill it fuller of blood*. This can be done only by muscular exercise. Breathe with your legs, not your ribs.

"But," says somebody at once, "I know from personal experience that to stand up straight and throw my shoulders back and take twenty or thirty deep breaths, with the windows open, clears the cobweb out of my brain, exhilarates me, and makes me twice as fit for work again as I was before."

Granted! But here comes in another fallacy,

or rather two of them. First, that of contrast! If you have been underbreathing in foul air for an hour or two, naturally it will make you feel better to get up and throw open the windows and overbreathe for four or five minutes. In that sense this spurt has been beneficial. But follow the experiment a little further and watch what happens after you sit down to your desk again. For a period of from three to fifteen minutes after your spurt of deep breathing, you will find that your respiration becomes so shallow as to be almost imperceptible and you will not resume breathing at your former rate until from five to fifteen minutes after your "stunt."

In short, in your spurt you have done your breathing in advance for the next ten or fifteen minutes and then you slow down until you have caught up your lead. This curious fact is one of the oldest commonplaces of the physiological laboratory. In fact, the condition has received a special name, the *eupnea*, or *physiologic apnoea*, meaning simply a state of normal stoppage of breathing.

Firefighters and divers have known for centuries that by breathing deeply and forcibly for five minutes, they are able to hold their breaths in thick smoke or under water for from two to four minutes, instead of the usual fifty seconds.

But besides this accumulative power, forced deep breathing has another curious and rather unexpected effect and that is its nervous or mental one. After ten or a dozen deep breaths, there is the well-known sense of exhilaration and comfort, quickly followed, if the pumping be persisted in, by slight sensations of giddiness, of fullness in the head, of floating in the air; while if the process be pushed a little farther, this increases to partial unconsciousness and even in some cases to the point of swooning.

The Fakirs of India and other mystics have for ages adopted this method in bringing themselves into the trance condition or starting their prolonged sleeps—persistent, forced, deep breathing, combined with the monotonous repetition of words or phrases of loud, booming, sonorous tone. So marked is its power that it has often been utilized by surgeons for the production of mild degrees of anesthesia, and in certain susceptible individuals slight and even severe operations can be performed under its influence without the patient's being conscious of the slightest pain. It has even been proposed by certain enthusiasts as a substitute for chloroform or ether, but has not been found practical in severe cases nor capable of application except in a limited percentage of individuals.

This curious cerebral effect, which is due to damming up in the brain the blood forced out of the lungs, is the real secret of the exhilarating and comforting sensations experienced by those who practice deep breathing. Most of its beneficent influence may be described, in the vernacular, as a "pipe dream," yet this self-hypnotizing procedure is vaunted upon all hands as if it were the real secret of perpetual health.

## CHAPTER II

### ATHLETICS AND THE HEART

**I**N the game of life hearts are trumps, but we have been leading from other suits first in athletics. For years we regarded athletics as chiefly a matter of muscles, yet totally ignored the most important muscle of all, the heart. It differs from the other muscles only in that it is hollow and that it never stops—until we stop.

We can literally build up our hearts as surely and as effectively as we can our biceps, both together in fact, in size and weight as well as in strength. The heart of a Derby winner, for instance, is nearly fifty per cent heavier in proportion to his body weight than that of a cart horse, and the heart of a Rocky Mountain sheep is twice the size of that of the woolly mutton chops on legs of our sheep-cotes.

The poets and moralists have helped to mislead us as usual. Our hearts are not pendulums, nor marks for Cupid's darts, nor reservoirs for holiness, nor

“Like muffled drums are beating  
Funeral marches to the grave.”

**They are just plain pumps.**

## ATHLETICS AND THE HEART 35

And they have the defects of a pump; they leak and they break down under strain, they have real "worms" that "gnaw" at their valves, and they won't last forever. But they have also the virtues of a pump, and some such as no other pump under the canopy of heaven has. They are self-driving, self-cleaning, self-repairing, geared to run three score years and ten, without ever slipping a washer or warping a valve.

If we must deny the heart some of the transcendental virtues and sentimental graces with which the poets have endowed it, we can also defend it against some of their slanders. It is not deceitful above all things and desperately wicked, nor a sink of original sin, nor a mass of corruption, but the pluckiest, cleanest, most devoted and unselfish fighter the sun shines on. Every other organ and tissue in the body may lie down and surrender, but the heart fights doggedly on and often turns defeat into victory.

Whatever else in the body may flee or turn traitor, the heart never shows the white feather, but keeps the red flag of courage flying over the body fortress. It mans the pumps in every storm and fights the fatal leak until the rising waters of the great sea of eternity are hissing upon the embers of life under its boilers and quenching its fires for the first and last time.

Not until "the pitcher is broken at the well and the wheel broken at the fountain" does our dust return to the earth as it was. Death is when our heart stops.

Our primitive logic in athletic training was that inasmuch as strength lay in muscle, therefore the way to grow strong was to increase the size of our muscles. The strong man was the man whose muscles stood out all over him in bumps and ropes. The earlier systems of gymnastics aimed to develop either suppleness and quickness, or massive strength in certain groups of muscles, but it was quickly found that literally the race was not to the swift nor the battle to the strong, but both to the long winded and the enduring; that mere strength of muscle or quickness of movement counted for little in the long run upon the athletic field, in war, or in the long, stern race of life, unless backed up by qualities of endurance and recuperation which are qualities of heart and nervous system.

To-day it is clearly recognized that the real field of athletic training is not the muscles, but the heart and the nervous system. The muscles, broadly considered, are simply the tools, the levers with which the heart can be built up and the nerves and brain trained.

The problem of the heart in athletics has as-



sumed a vivid and painful interest in recent years from another cause, the frequency with which death by heart failure is reported in champion athletes, crack oarsmen, and strong men of all sorts. To die of a broken heart appears to have become almost as fashionable among athletes as it was among the heroines of the early Victorian novels. We hear athletics vigorously denounced in many influential quarters on account of their injurious effects in overstraining and dilating the heart, especially in young girls and growing boys. How much of this is the fault of athletics and how much of the heart?

There is nothing better for the heart than athletics in reason and in moderation. The only known way to keep an organ healthy is to give it just enough exercise to make it comfortably tired every day, or at least five days out of the week. Even our modern methods of curing a diseased heart are not solely rest and as little bodily exercise as possible, but all the exercise in the open air that the damaged heart will stand, so as to strengthen the muscles of its wall, to overcome, or, as we say, compensate, for the leakage of its valves, just as in a leaky pump, you apply more "elbow grease" to the handle to keep up the stream from the spout.

One of the fathers of medicine, Sydenham, used

to make his wealthy patients with heart disease get out and run behind their own carriages, and one of the most effective modern methods of the European health resorts is to make the patient walk up hill a measured distance and gradient every day, increasing steadily both the length and the steepness of the climb. There is, therefore, absolutely no inherent or necessary danger to the heart in athletics. It is only unintelligent, or mistaken, systems of training that are at fault.

But serious as these mistakes and stupid as certain methods of training have been, it may be stated broadly, even admitting the charges brought against athletics of deaths and lifelong disabilities from overstrained and dilated hearts, that the extraordinary growth and popularity of athletics in the past fifteen years have benefited at least ten times as many hearts as they have injured. The worst and most dangerous form of exercise for the heart is none at all.

The heart by working overtime within reasonable limits gets, so to speak, more money to spend and can either increase the size of its muscle fibers, or bud out and build new ones, so that it will be a stronger and more efficient pump than it was before. This increase in strength and size, which may go as high as from twenty-five to fifty per cent, is called physiologic hyper-

trophy, or healthy overgrowth. This degree and amount of exercise, with the appetite for food which it gives, is the very life of the heart, and no body-pump can be kept healthy and in good condition without it.

But if it be not kept within such reasonable and moderate limits, then new things begin to happen. The smoke and ashes produced by the millions of tiny cell explosions in the muscle cylinders are by no means innocent and harmless figures of speech. On the contrary, they are active poisons, both to muscles and nerves. When they pile up in our bodies to a certain level, our body-bugs or cells begin to get a headache, and we become conscious of fatigue or tiredness, drugged with our own poisons.

For the relief of this fatigue, as for hunger, Nature has provided an instinct, namely sleepiness, or in lesser degrees, plain laziness. Paradoxical as it may seem, gluttony and idleness are among our greatest safeguards and blessings, instead of the unmitigated curses they are usually preached to be. If we disregard this warning instinct and keep up the struggle, pouring more fatigue poisons into our already overloaded blood, then a very distressing and dangerous condition develops, that of over-fatigue or self-poisoning.

---

Every particle of our tissues, brain-cells, nerve strands, heart wall, liver, eyes, ears are saturated with these poisons; our legs begin to feel like lead, our ears to ring, our sight grows dim, we stagger and reel in our gait, the muscles of our face, particularly about the nostrils and mouth, are drawn and set as in the death agony, and we stagger desperately onward, blinded and half unconscious until the line is crossed or we pitch forward in a dead faint like Dorando in the Marathon race. We are as badly poisoned, self-poisoned, as if we had a million cholera or typhoid bacilli at work inside us, pouring their toxins into the blood. This is where the danger to the heart in athletics comes in.

A like desperate condition can be brought about in animals. Horses, as is well known, can be galloped until they actually drop dead, or fall in a state of exhaustion, which leaves them practically ruined for life. Deer, foxes, and other beasts of the chase can be hunted until they fall dead, or unconscious. So profound is this self-poisoning and so quickly does it come on in untrained animals or men that it is one of the many merciful compensations of Nature that animals hunted and remorselessly run down, whether by their natural enemy, the wolf, or his domesticated cousin, the hound, are self-narcotized to the verge of uncon-

sciousness before they are overtaken, so that they scarcely feel the fangs of the pack.

The same thing is unquestionably true of men killed in battle or in single combat after a desperate and prolonged struggle. Their brains and higher senses are drugged by their fatigue poisons into a condition bordering upon delirium. Their only thought is to follow out the line of action upon which they started, as a paranoiac follows his fixed idea, and to die fighting. They may even forget that they are in danger of being killed, or, if the thought occurs to them, it has no terrors for them.

As any old soldier can tell you, they will often suffer the most frightful wounds, whether by bullet or sword, without pain and without even knowing when they received them. Many a man has fallen in a faint the moment that victory was assured, or the last hope was gone, bleeding from a serious and even mortal wound of whose very existence he was utterly unconscious up to that time. It is also probable that not a few deaths in battle, after a prolonged and desperate struggle, are due to sudden heart failure from an intolerable piling up of these fatigue poisons, acting upon a weak or diseased heart.

Fully half of the so-called brute courage of the bull dog and the average fighting man, which

---

forgets as soon as it gets well warmed up to the fight that there is anything else in the world but just fighting, and tears and slashes and fights blindly on, utterly regardless of fear or danger, is due to this form of auto-intoxication. Much of the "deathless courage" vaunted in song and story is nothing but plain fatigue-delirium, but this again is a merciful provision of Nature.

A good many of us in the ages of the past have had to die fighting, and it was well that we should be able to enjoy it when the time came. Death in battle is really little more to be dreaded than the "straw-death" which the old Norse heroes had such a contempt for, and that is preceded by self-narcotization, not merely for hours, but even days and weeks.

It is only when we are alive that we fear death, not when we are actually dying. But we cannot seem to realize this and grasp the truth of the shrewd old Methodist exhorter's saying that "we can't expect to git dyin' grace to live by."

It may be remarked in passing that this fatigue intoxication accounts for that singular symptom in overfatigue or overwork of any sort which so often presages a breakdown, that you reach a point where you are utterly unconscious of the fact, and cannot even be made to believe, that you are overworking. In other words, you reach

a state where you cannot stop until something either goes "Bang!" or you are forcibly removed from your task by some one who has authority over you.

Much of the profound contempt for idleness, the determination to employ profitably every moment of your time, even if only with fancy work or other busy foolishness, the inability to be satisfied unless you are doing something, the virtue of excessive industry in fact, are little better than mild forms of fatigue-delirium. Exemplary industry like extreme conscientiousness, worry, and eminent piety, is a morbid symptom and should be regarded and treated as such.

But in spite of all this, even such an extreme and appalling stage of overexhaustion as pushing the race or the struggle until we literally, as we say with graphic hyperbole, "drop dead," or are "tired to death," is a surprisingly harmless phenomenon and astonishingly easily and rapidly recovered from. Though it is, of course, only common prudence to avoid it whenever possible, fatigue to the point of utter exhaustion leaves no permanent after-effects whatever nine times out of ten. In fact, we are coming to doubt whether it ever does so *unless it falls upon an already weakened or diseased heart*. Here is the crux of the whole problem of the danger of athletics.

There is the soundest of biological reasons why running, or fighting until you drop is seldom fatal, or even permanently injurious. Scarcely one of our male ancestors, human or prehuman, for the past five million years, but has been compelled by the sternest of necessity to pass that form of civil service examination and survive it, not once, but a dozen times. If you couldn't run until you were on the verge of dropping dead, either to catch your dinner, or to avoid becoming something else's dinner, the chances of your days being long in the land were slim and poor.

The story that even the runner of the original Marathon race, all untrained and battle-exhausted as he was, fell dead after delivering his tidings, is little better than legend, added for the purpose of heightening the dramatic effect of the tale. The most severe of strains falling upon a sound heart and well trained muscles will leave astonishingly little permanent after-effect, though the risk should never be lightly run.

One of the most interesting recent developments of physiology and biological chemistry, largely due, as so many other valuable advances have been, to the genius and insight of that wizard of science, Jacques Loeb, is that the role of oxygen is not, as was at one time supposed, to combine with, or burn the food stuffs and furnish



energy for the work of the body in the form of heat, but to burn and neutralize these fatigue poisons. It is too wide and deep a question to be gone into here, but the belief is steadily growing that the real life-processes of our cells or body-bugs are carried out in the absence of oxygen and without the evolution of any heat whatever.

As one of our French physiologists, Armand Gautier, with that fine dramatic instinct for epigram typical of the Gallic mind, puts it, "*La vie intracellulaire c'est les vie anaerobique*" ("the life within the cell is the life without air"), a discovery which bids fair to revolutionize physiology and medicine almost as the discovery of radium has chemistry.

So much indeed is the neutralization of these fatigue poisons a matter of oxygen that we are actually able now to neutralize them artificially by the inhalation of pure oxygen gas. Dr. Leonard Hill, the distinguished English physiologist, proceeding upon Loeb's findings, began some years ago administering oxygen from a tank to runners in long distance races and athletes engaged in various feats of endurance.

The results were most gratifying; the exhausted and gasping runner, inhaling pure oxygen gas for two or three minutes, would rise and bound forward again, apparently almost as fresh as when he

started and with little or no after reaction or recoil of depression, such as invariably occurs after the so-called stimulants, alcohol, cocaine, etc., none of which, by the way, are stimulants at all, but pure narcotics, and "refresh" the runner only by numbing his senses to the fatigue discomforts. In the near future the exhausted and perspiring athlete may walk into the club house to call for an oxygen fizz instead of a Scotch highball, and Polly, instead of putting the kettle on when John comes home tired after his day's work, will ring for the oxygen tank.

With the assistance of oxygen and the wondrous fatigue-antitoxins which she has trained our cells to produce, Nature has simply astonishing powers of recuperation against any strain or danger to which she has been accustomed for thousands of years, but when it comes to dangers of more recent growth and less geologic antiquity, her compensation is not so perfect.

There is a group of enemies of the heart, historically old, it is true, but geologically of the most recent, against which Nature has not yet perfected her defense, although she puts up an excellent fight against them, and that is the germs of the infectious diseases and their poisons. All of these are born of civilization, spawned in the period when men began to crowd together into

kraals, villages, and hill-forts, breathing one another's breath, devouring the bread out of each other's mouths, and drinking each other's excreta in well-water.

Small detachments of these germ enemies the body cuts to pieces with its leucocyte cavalry; masses of them it mows down by the platoon firing of its heavy infantry, the fixed cell-bugs of the body. It manufactures antitoxins against their toxins, antibodies and solvents, which will melt down and destroy the living germs themselves, and nine times out of ten, yes, ninety-nine times out of a hundred, its dashing and brilliant fight is successful, but at the hundredth attempt they slip past its lines and attack one of the great central fortresses, the heart, the lungs, the brain, or the kidneys.

When they reach the heart, they strike for the weakest point, namely, the valves. If you want to cripple a pump you slash or tear at the valve of its bucket; and the heart, in spite of all that has been said and sung about its beating high with pride and swelling with magnanimity and throbbing with emotion, is nothing but a pump.

In the beginning it was of the simplest, just a hollow muscle, or, more accurately a loose, spongy mesh of muscle fibers which, at regular intervals, contracted and squeezed the blood out of

---

its pores, a mere self-squeezing muscle sponge. It didn't seem to care where the blood went, just so long as it moved on; it was a sort of body policeman, in fact.

When it became desirable to keep the blood moving in one direction, valves budded out as folds or flaps from the inside of its mouths. Soon it became divided into a receiving chamber, auricle, and a pumping-chamber, ventricle. Then when the lung came along, it cut itself in two, making a weaker right heart to pump the blood through the lung and a stronger left to drive it all over the body, and we have the heart as it is to-day with its two intake-hoppers, two driving chambers, and four sets of valves.

As the beat of the heart became more rapid and powerful, the valves, which were originally simple folds of muscle and lining, became thinner and tougher and more fibrous, until now they are mere smooth-coated flaps of thinnest rawhide, swinging backward and forward ceaselessly to the pendulum of the pulse. The thinner and tougher they became, the smaller and fewer naturally became their blood vessels, so that to-day they are both "the deadest" and most severely tried tissue in the heart, as well as the youngest, which counts for much in biology.

When the germs of infectious disease break into

the blood and are carried to the heart, their first, commonest, and deadliest lodgment is on the under side of the valve-flaps. Here they nest and breed and eat into the substance of the valves. These become swollen and sticky, can no longer close the opening of the heart pump properly, an ulcer forms, which, by its healing, warps the valve out of shape, and the heart pump has to fight for its life and for the body's life at once.

Even then Nature has forces in reserve. If the patient be kept absolutely at rest and either an antitoxin manufactured for the purpose injected into the body, or the body supported until it can make its own, the invaders may be expelled, the crippling swelling of the valve may subside, and the ulcer heal without contraction or scar. But unfortunately often, with the utmost that she can do, the invaders, though beaten, leave their mark behind them; the valve is eaten away at its edge, or twisted and warped by the contraction of the healing scar, so that it will no longer properly close the opening, and we have what we call valvular, or organic, heart disease.

This, however, is by no means the sentence of death it was at one time supposed to be. Taking advantage of our wonderful power of heart-building by intelligent muscular exercise, we can in nine cases out of ten, where the damage is not too se-

vere, increase the thickness and power of the heart-muscle until, by driving more blood at each stroke, it can, in spite of the fact that part of it leaks back, or regurgitates, through the broken valve, pump a sufficient amount through the body and the lungs to supply the tissues with food and oxygen. When this has occurred we say that compensation is established, and with proper care, intelligent exercise, good feeding, and avoidance of unnecessary strains, this compensation may be maintained, not merely for years and decades, but until the patient actually dies of something else.

The diseases which most frequently damage the heart in this way are, first and far commonest, acute rheumatism, or rheumatic fever, the different forms of blood poisoning, typhoid, pneumonia, scarlet fever, diphtheria, and even ordinary tonsillitis and common colds.

Most of these heart involvements occur late in the disease, often during the period of recovery. The best cure for them, and one that will be effective eight times out of ten, is absolute rest, and the worst possible danger is *putting the body, and indirectly the heart, to work again before it has completely thrown off the attack and repaired the damage.*

This is where the greatest single danger of athletics to the heart comes in. A boy has had, it

may be, a comparatively mild attack of one of the infectious fevers, typhoid, pneumonia, influenza, or tonsilitis; he is still a little weak and his heart beats more rapidly and violently than it should on exertion, but the team needs him, or he is anxious for a certain record, and he starts back into training with a heart which has not fully repaired its damage. Or a girl cannot resist the temptation of a long-anticipated dance when she is barely convalescent.

Now while exercise falling upon a healthy heart is beneficial and stimulating, it is everything that is the reverse upon a diseased or poisoned heart. Instead of the muscle wall of the heart becoming thicker and more vigorous under the strain, it gives way and dilates and thins until the heart becomes like a thick-walled, wet, brown-paper bag. Suddenly one day it can no longer drive on its overload of blood and down goes the runner or oarsman or dancer overcome by an attack of heart failure.

A healthy hypertrophy or overgrown heart is an advantage and an asset in the battle of life, although it has certain dangers connected with it, which will be explained later. But a dilated, ballooned-out heart is a damage and a handicap, often lifelong; at best requiring years of careful living and management to recover from it.

Every athletic trainer or coach ought to be compelled by law either to take a medical degree, or at least such physiological and medical training as that possessed by a trained nurse, for instance, which would enable him to recognize these dangerous conditions of the heart and to discover when it is doing badly under training. Then one of those pitiable accidents should cost him his position at once.

There is another way in which the infectious diseases may damage the heart and lead to serious trouble in athletics. Even though their germs may not succeed in effecting a lodgment upon the valves of the heart and produce what we term mechanical defects, or organic disease, the persistent saturation of the whole body by their poisons may so affect the heart muscle that it becomes inflamed, and even begins to break down into fibrous tissue or fat (the much-dreaded brown atrophy and fatty degeneration of the heart, respectively), or thicken and swell and become inflamed and gorged with blood and exudate.

If this process of heart poisoning be severe enough, it may literally paralyze the heart muscle and rapidly cause death. Indeed, as a matter of fact, death in a large number of our infectious diseases, especially pneumonia, tuberculosis, and diphtheria, comes from heart failure due to this saturation poisoning of the heart muscle.



Hearts are trumps, and whenever the ace is played, everything else falls. All deaths are ultimately deaths by heart failure, and consequently vital statisticians and the census bureau refuse to accept "heart failure" upon death certificates as a definite cause of death.

What more commonly happens, however, is that the heart rallies and gradually recovers from the saturation, but remains for weeks and even months afterwards thickened, swollen, and inelastic, doing its work with difficulty and ready to break down and dilate under any strain. Now, let a boy or man with a heart like this be placed in training for a contest or entered for an event, and it is easy to see what will happen. All the ground that the heart has so painfully regained will be lost promptly.

It is a fact significant of the care that should be exercised in placing muscular work upon an imperfectly recovered heart that far the highest percentage of both heart disease and of that process of decay in the blood vessels which we call arterio-sclerosis occurs in men of vigorous habit and strong physique who are compelled to earn their living in laborious muscular occupations, such as lumbermen, miners, dock laborers, porters, and unclassified day laborers of all sorts. Physicians living in the neighborhood of big lumber camps, sawmills, and mines recognize condi-

tions which they describe as "lumbermen's heart," "miner's heart," etc.

The heart complications of rheumatism are far commonest in agricultural laborers, hod carriers, and poorly paid, hard-worked, and badly fed day laborers of all sorts among men and in over-worked and underfed servant girls and maids of all work among women.

If both trainers and contestants would adopt as their motto, "Be sure you are completely recovered, then wait a month," before going into training or entering for a contest, three-fourths of the injurious effects of athletics upon the heart would be avoided.

It must also be remembered that the repeated piling up of excessive amounts of these fatigue poisons in the blood and in the heart may produce somewhat the same injurious effects, though in lesser degree, as the toxins of infectious disease. Acute dilation, thickening, and inflammation of the wall of the heart may be brought about in young and rapidly growing boys and girls merely by an unreasonable repetition of those strains, with their consequent fatigue saturations.

By the mercy of Heaven, the young human animal is astonishingly tough and resilient, and experts who have had wide experience in diseases of the heart are in the main inclined to agree with

the great English physician, Sir Clifford Allbutt, that permanent damage to the heart from athletic exercises and strains in youth is comparatively rare, except where these strains fall upon a heart already diseased, or not completely recovered from an illness.

Repeated excessive saturations with fatigue poisons may bring about a chronic weakening of the heart, so that upon the attack of some acute infection, like pneumonia or typhoid, it cannot resist as vigorously as the normal heart.

This is the explanation in part of those distressing deaths from acute infections of champion athletes, both college and professional, in the prime of life, and of the fact that champion athletes, as a class, often show a higher death rate from tuberculosis, pneumonia, and typhoid than the average of their age and social condition. They have either overtrained their hearts, or, so to speak, trained them so exclusively to devote all their powers to resisting and compensating for mere physical strains that they have no reserve power left against any other kind of attack.

## CHAPTER III

### MUSCLE MAKETH MAN

**I**T is no accident that muscle makes nearly half our body weight. Indeed, if we add in the bones, whose only use on earth is as stiffening and levers for the muscles to pull us about by, and the tendon and ligament ropes and sinews which tie the two together, we may regard ourselves as practically two-thirds muscle and its tools. Fundamentally considered, man is but a cast of his stomach, a food-tube surrounded by a thick mould of muscles. The mutual duties of the two are simple. The business of the stomach is to provide food-fuel for the muscles, and the business of the muscles is to capture more food for the stomach. This is the endless circle which we call Life. All other activities and accomplishments of the human body are merely incidental to it.

Muscle is the largest consumer in the body politic, and its rights and tastes are entitled to a proportionate amount of consideration. Muscle cells are the Plain People of the human republic, with all the characteristics of devotion, indus-

try, and uncomplainingness which characterize that back-bone of the state. In spite of its huge bulk and incessant activity, muscle is far and away the healthiest tissue in the body. It has almost no disease of its own, none that originate primarily or exclusively in it, except the temporary disorder of fatigue, and the only cause for which it ever fails the body politic is from the cutting off of its fuel supply, or the poisoning of its food, or the paralyzing of its nerves.

Humble and uncomplaining beast of burden as muscle is, it is by no means the footstool of the body structure. On the contrary, it is, in some respects, the most highly specialized, the most vital and wonderfully complete piece of mechanism of all the tissues in the body. Fundamentally considered, we understand thought even better than we do muscular contraction, and which is the greater mystery, and which the most vital and important functions of the body, would be a question open to debate.

Unexpected as it may seem, the cell in the body which shows the most exquisite and elaborate complexity of structure under the microscope is neither the brain cell, nor the cell of the secreting gland, nor even such a wondrous piece of optical specialization as the famous rod and cone cells of the retina, but the ordinary muscle cells, the

lean meat of the body. The stronger the microscope under which it is placed the more elaborate and intricate does its structure become. And that commonest of all phenomena, a contraction by which, for instance, we lift our hand toward our mouth is accomplished by a most wonderful and complicated rearrangement of the dark and light tiles in its pavement-like structure, deploying in columns of four and eight and returning to their original formation again like a fancy drill in an army, or an old-fashioned square dance. Even under the ultra-microscope and with polarized light, the meaning of this quaint and singular dance of molecules in the muscle fibre is as much of a puzzle as ever.

Some day we shall solve the problem, and when we do it will bring us nearer to the secret of life than almost any other possible discovery. Each tiny muscle cell is, to put it very crudely, a dynamo and a carburetor and a dry plate electric battery combined. Those singular structures, the famous electric organs, in certain eels and other fishes which generate enough electricity to give a serious disabling shock to anyone touching their possessor are, so to speak, exaggerated muscles with the battery power common to all muscles excessively developed, and in their plate-like structure quite closely resembling a mass of

muscle cells arranged for explosion rather than for contraction.

So it is a great mistake to regard muscle as in any sense an inferior or low grade substance in the body. On the contrary, it is one of the highest triumphs of specialization, quite as wonderful as our nervous system, or our secreting glands, and, in vital importance, second to none of the organs of the body.

In addition to its indispensability as a food catcher and general motive force for the entire body, muscle serves another most vital purpose which is not generally known, and that is the keeping up of the body temperature. The foundation for everything that distinguishes the warm-blooded mammal and bird from the cold-blooded fish and reptile is laid upon muscle. Of course, we know perfectly well that we can warm ourselves by muscular activity and that if we take no muscular exercise we suffer greatly from the cold, unless we use some artificial means, such as clothing, fire, etc., of raising the temperature of the air about us. But what is not generally known is, that even when we are sitting, or even lying quietly, there is still a steady chemical action going on in our muscles, a form of combustion which gives off heat, and, with some assistance from similar processes in our liver, pancreas,

stomach, and other glands, keeps up our body heat to the normal temperature.

This is strikingly shown by the fact that there happens to be a drug, curari, originally discovered and used as an arrow poison by certain Indian tribes on the Amazon, which has the peculiar power of absolutely paralyzing the muscle cells all over the body by its toxic effect upon the end plates, or nerve terminals, in them. When an animal is poisoned with this drug it not merely becomes absolutely motionless and lies like a dead thing, but its temperature rapidly falls until it reaches the level of the surrounding air and, unless something is done to check the process, the animal literally freezes to death. If, however, the animal be kept in a hot chamber life can be prolonged for hours, and if the dose administered be not too great it will entirely recover, while in a cold room it would have promptly died from the effects of the poison.

Our voluntary muscles are our own automatic steam-heating apparatus which by their incessant chemical and electric activities keep our bodies at that wondrously even and self-sustaining temperature which alone makes the triumphs of the warm-blooded creatures possible. Chill us below that point, for any considerable period, and we promptly fall, first into a state of hibernation,



like that of the bear or woodchuck, and then into the "sleep that knows no waking."

We little realize how tremendous and incessant this unrecognized activity, this subconscious contraction of muscle is. We all know, of course, that one muscle in the body contracts and relaxes unceasingly every three-quarters of a second day and night from birth until death, and the stoppage of the daily swing of this muscle means death whenever it happens. Even the poets long ago recognized that rhythmic, never-tiring throbbing of the heart "*Ohne Hast, ohne Ruhe*," though with their customary perverseness they insisted upon describing it as a muffled drum, beating funeral marches to the grave, instead of a grand, triumphant Soldiers' Chorus march through life, as it really is.

What we do not recognize is that, as a matter of fact, we are, so to speak, all heart and that the whole muscular half of our body bulk is throbbing and beating incessantly at a rate so rapid that we cannot count it and with a rhythm so regular as to defy scansion, but as incessant, nevertheless, and almost as necessary to life as the brainless, monotonous treadmill beat of the heart. We have shortsightedly imagined that the heart was a special paragon of industry and devotion and unweariedness among the muscles, but Loeb

showed years ago that this habit of constant, automatic, rhythmic vibration is one of the lowest, most primitive and fundamental powers of muscle, found for instance in its perfection in the jelly fish or the sea-cucumber. In fact, as he showed by a simple but most revealing experiment, all you had to do was to send a current of sea water flowing through the blood vessels of a warm-blooded, voluntary muscle to make it revert to the primitive and begin contracting or pulsating of its own accord, as rhythmically and steadily as if it were the heart itself.

The secret of health is to keep both the heart that beats all over the body and the heart pump that beats in the chest well exercised, well fed, and well ventilated.

Of course the enormous and indispensable part played by muscular action in the work of life is obvious to the dullest eye. Everything that we regard as a sign of life is a form of muscular action. If it were not for our muscles we might as well be dead, in fact we would be if they stopped contracting. Every word that we utter, every gesture that we make, every expression, every change of color of which our countenances are capable, is produced by a muscular contraction. We may have thoughts without muscular action, but we could not express them, we could not even

put them into definite and logical form for expression without it.

Not one single tiniest step could we take toward communicating with, or impressing, anybody or anything outside of our own skin, if it were not for muscle. The whole brain, mighty and massive as it is, began in the first place, and has been built up ever since, simply as a telephone exchange for translating the messages brought by our eyes, ears, and noses into orders to our muscles.

Appetite is the mother of the brain, and muscle its father. All that we know even to-day about the mapping out or localization of the surface of that great gray globe, which we call cerebral hemispheres and are so inordinately proud of, is that certain areas of it are concerned with light images and the sense of sight, others with sound waves and the sense of hearing, another with smell, another with the movements of the body, of the shoulder and the arm, of the foot, the hand and the mouth. At a point where these two latter areas, hand and mouth, combine is situated the famous speech-center of Broca, the destruction of which would turn in an instant a Demosthenes into a "dummy."

Man without muscle would be speechless and, for all practical purposes, mindless. Across the

vacant areas of the brain surface not occupied by sense-centers or motor centers, we are accustomed to scrawl boldly in the frontal region, "Abstract Concepts," and in the occipital region, "Concrete Concepts," but these are little better than brave names to conceal our real ignorance. All that we really know about the most magnificent modern brain is that at least seven-tenths of it was built up by and for the exercise of the senses and the movements and co-ordination of the muscles, and that the remainder of its bulk probably grew directly out of one or other of these needs. The whole instrument of the mind and the tool of thought is built by the senses and the muscles. Is it any wonder that we are coming to regard that harmonious and healthful mutual development of both these powers called play as the most important part of education, not merely during childhood, but all through life.

Never till we are ready to graduate from the university of life, which ought not to be before sixty-five or seventy, should we cease to regard play as one of our Major Electives. Play makes the child into a man and keeps the man a child, growing and improving all his life long.

But the unique and practically important thing about muscle is that it alone of all the body tissues is directly under the control of the will.

That is to say, three-fourths of it is, which we accordingly mark off from the other one-fourth, the heart, the walls of the stomach, intestines, etc., as voluntary, or because it is attached to or connected with the bones of the skeletal muscles. Here is the one instance where by taking thought we can literally, Scripture to the contrary notwithstanding, add to our stature. The Japanese schoolboy and the young Japanese soldier have already, according to the latest government reports, added nearly an inch to their average stature, by dint of proper exercise and training and satisfying the appetite created by this, with abundant and nutritious food, rich in proteins, beef, pork, and wheat-bread instead of rice and fish.

We are utterly powerless to improve our appetites by a mere effort of the will, but send the order indirectly by way of those ever willing middlemen, the muscles, and a brisk walk of forty minutes in the open air will work that miracle for us. We cannot increase our lung capacity by merely thinking big-chestedly, nor by deep breathing exercises, or other foolishness of that description, but we can readily expand our chests two to four inches by a course of proper all-over gymnasium exercises, by cross country tramping, by rowing, wrestling, or playing tennis. In fact if

we want to increase the metabolic reducing power of our livers, the digestive power of the pancreas, the size and vigor of the heart, the length of our "wind," the clearness and vigor of our thoughts, the sweetness of our tempers, and the soundness of our morality, all we have to do is to give the appropriate order to some group of muscles, and the larger the group the better.

Naturally, since muscle and its attachments form such a large proportion of our body bulk and weight, the question would arise, what, if any, particular diet or kind of food is best adapted to the needs of the muscles, or most necessary for health and efficiency? Fortunately, the question is an easy one to answer, for the appetite, so to speak, of the muscles is of the broadest and most catholic character. They can eat anything, utilize everything, and all is fish that comes to their net. Any sound, nourishing food which is suitable for the use of the body as a whole will give good working power to the muscles and keep their machinery in good repair.

The muscle fiber is really a series of tiny cylinders, not unlike those of an automobile, in which the food-gasoline brought by the blood is burned in a series of tiny explosions which produce power and heat. When foods began to be studied systematically, it was assumed that inas-

much as the starches and sugars are composed of nothing but carbon and water and are the nearest approach to coal in our foods, they would be best adapted as fuels for the use of muscles, so that the crude classification of foods, those of Liebig, for instance, divides all foods into the respiratory and the plastic, that is the starches and sugars, which, being burned to water and C. O.<sup>2</sup> in the muscles and in the lungs, were supposed to give off most of the heat and energy of the body, and the proteins, or nitrogen-containing foods, such as meat, milk, eggs, cheese, etc., which were supposed to be chiefly useful in repairing the wear and tear of the body. All actively living tissue (known as protein) contains large amounts of nitrogen, and it was therefore not unnaturally supposed that our nitrogenous or proteid foods were chiefly needed for the purpose of making good the wear and tear in the living tissues of the body.

Hence the early dietaries were constructed on the principle of a certain amount of nitrogenous food, or meat, to repair the wear and tear of the body machinery and a larger amount of non-nitrogenous carbohydrate food (sugars and starches) to supply fuel for its daily running; this was fixed in the ratio of about three to one, that is, one-fourth meat and three-fourths

starch—bread, puddings, potatoes—and this still forms the basis of most of our textbook dietaries.

It was soon found, however, that this theoretical division of foods would not hold in practice, for the simple reason that proteid, or meat, could readily be burned in the body in large amounts so as to generate energy and heat, as was readily proved by feeding both animals and man at heavy work upon a pure meat diet. In fact, meat is the only single food known upon which alone man can both do his work and keep up his health and vigor for an almost indefinite period.

We still clung, however, to the idea that all the meat that was needed was enough to give nitrogen to make good the loss of nitrogen from the wear and tear of our own tissues, and we even filled out a more or less mythical law according to which the natural lifetime of the cells of the body was not to exceed seven years, so that we were constantly being made over at least once in that period all our life long. This theory, however, was pretty nearly imaginary, and more careful and accurate methods of investigation have shown clearly of late years that our body cells are a great deal tougher and more long lived than we had any idea of and that the actual amount of wear and tear in them is much smaller than we had formerly supposed. In other words, our



body boilers are not merely copper lined, but steel-clad and can burn a tremendous amount of fuel under them and generate an enormous amount of steam without much corrosion or deterioration.

A large share of the nitrogen waste which passes out of our body, chiefly in the form of urea from the kidneys, comes, not from the wear and tear of the body cells, but from the nitrogen of our food, and the general belief now seems to be that only a very small percentage of our total nitrogen excretion is due to the wear and tear of our cells.

In fact, we have gone back to the broad and reassuring general conclusion that the principal thing to be considered about foods is their fuel value and their digestibility, without regard to whether they are meats or starches, animal or vegetable. A certain proportion of meat or proteins must be included in order to furnish repair material for the body and keep it in health, but the actual amounts of meat and starch in a dietary must be determined by their fuel value and digestibility, the appetizing character of the two classes of foods, and by what general and wide experience has shown is the proportion best adapted to maintain the body in health and protect it against the attack of disease.

This, not only by the universal experience of mankind, but also by the best and most careful laboratory experience, has now been found to come surprisingly close to the old three to one rule-of-thumb standard of the early dietaries, such as is represented by the ordinary meal of a slice of meat or fish to a couple of slices of bread, potatoes, vegetables, and a good helping of pudding or of dessert. Certainly any class or nation which runs much below this standard of diet will be found to be inferior in stature, in physical vigor, and in longevity, as well as in resisting power to disease. No nation has ever yet been known to get too much protein into its dietary, though certain of the wealthy classes of society are supposed to have offended in this regard, to their injury. The evidence for this last is exceedingly doubtful. Protein has the advantage of being more appetizing, more easily and more quickly digested, and more readily burned in the body than starch, and an abundance of it in any dietary is the price which must be paid for health and vigor nine times out of ten.

This is particularly true of young children and of growing boys and girls. On the other hand protein is much more expensive than starch and produces in its combustion certain acid substances which if they are retained in excess may become

injurious to the body and is more difficult to handle without tainting or spoiling. Starch has the great advantage of being cheap, supplying a clean burning of fuel at low price, of being easily stored or kept for long periods without spoiling or tainting, and of forming, when burned in the body, substances which are both promptly got rid of through the lungs and combine with and neutralize the acid products produced from the combustion of meat. So the combination of the two in proportions ranging from two to one, to four to one (combined in both cases with about one-half of one part of fat), gives us almost an ideal dietary, from both a common sense and a scientific point of view.

What God has joined together on the table, let no man put asunder. The habit of eating bread or potatoes with our meat, toast with our eggs, crackers or mushes with our milk, and buckwheat cakes with sausages, has a sound basis both in experience and physiology. The man who would put beef twice a day upon the table of every working man in the country would be the greatest benefactor that the world has ever known. A good all around "home-cookery" sort of dietary, bread and meat and puddings and milk and eggs and vegetables and fruits and cheese and cake and pie, will give the best results the year round, both in

muscle development and in general health and vigor.

It has frequently been the custom of trainers for the prize ring and for general athletic contests to adopt peculiar special dietaries as best adapted to the growth of muscle and the development of wind. Many of these were purely whimsical and based upon the impression that certain foods were specially strengthening, or even that, in the case of prizefighters, they lent a certain amount of hardness to the tissues and of viciousness to the temper which were conducive to success in the ring.

The first "fighting-food" of this description was, and even yet is, rare beefsteak, or even raw beef, upon which some of our athletes and pugilists have been fed almost exclusively during their training days, with strict limitation of the amount of bread, and that usually in the form of toast, and an interdiction of sweets or fruits. There is probably no other single food upon which they could have been gorged to this extent with less damage; combined with their breathing, rubbing, and vigorous exercises in the open air, many of them trained well upon this purely carnivorous diet and suffered no particular ill effects. Others, on the other hand, lost their appetites, became unable to sleep, grew nervous and

cross tempered, and in the language of the turf "went stale," largely on account of the utter monotony of their diet.

Better results are now obtained with less expense and less risk of loss of appetite and "staling" by a well selected and well varied mixed diet, instead of forbidding sweets, or drinking at meal times, and the cutting down of the amount of water or other liquids consumed to the lowest possible amount. This latter was supposed to produce a hardening effect upon the tissues, to diminish the softening effect of excessive perspiration, and to improve the wind. As a matter of fact, it did none of these things at all. Its origin appears to have been two-fold, partly because it was supposed in early days to be necessarily good for anyone who would deliberately endure the intolerable discomforts induced by it, and partly and more weightily because it was the most effective known means of reducing weight so as to bring pugilists down to the level at which they were required to weigh in.

For the last purpose, nothing has been invented so efficacious, but its general effect was decidedly injurious. All the flushing of our body sewers must be done with water, and cutting down the amount of fluids drunk, combined with the prohibition of fresh vegetables and fresh fruits, not in-

---


frequently resulted in distressing eruptions upon the skin, and particularly in crops of boils, which were the dread of every training gymnasium or college training table under the old régime.

Another fad of the systems of athletic training is the habit of inducing profuse perspiration, either by exercise in a warm room or by walking, jogging across country, or rowing in heavy flannels and jerseys, out of which has come the popular out-door garment of the day under the significant name of "sweater." This was supposed to harden the tissues, melt down all superfluous fat, and in some mysterious way "get all the softness out" of the man in training, so that when he had reached a point where even the most prolonged and vigorous of exertions would cause little or no perspiration, he used to boast that he was "fit" because there was "no more water in him." Needless to say that if the latter statement had been even approximately true, he would have been reduced to the dimensions and vitality of a mummy, for we are only a walking aquarium and every one of our living and working cells must be kept flooded with water or it dies.

To such extraordinary extremes were these two processes of cutting down on the supply of water from without and sweating out every possible drop of it from within carried that both

trainers and pugilists have told me of gains in weight of ten, twenty, and twenty-five pounds within the first week after the fight or contest was over, and some have even declared they actually gained weight during the fight itself, though whether they sucked this weight in in the form of moisture out of the surrounding atmosphere like a dry sponge, or from the water with which they were allowed to wash out their mouths between rounds, they were unable to inform me. But they swore positively that so great had been the tension of training that the minute it was released by the first blow of the fight they began to absorb moisture at once, and were most positive that they weighed from three-quarters of a pound to a pound and a half more when they stepped out of the ring a victor, than when they went into it—a statement which I merely record without comment or criticism, save a marginal note of “important, if true.”

All these more or less futile attempts at drying out the tissues, while they would give for the time a feeling of increased lightness and activity, and might possibly increase the power of concentrating every ounce of energy in the body upon some single specific task for a few minutes, were, in the long run and in the main, injurious, because in so far as they were successful, they diminished



that free flow of water through all the body tissues which is absolutely essential to life and health and caused the accumulation in the tissues of both fatigue poisons and food poisons. Applied in a moderate degree to men who have been under-exercised and over-fed and were soft and overloaded with fat, they were useful, but they were very apt to be overdone and to assist the reaction of diet in producing that *bête noir* of all trainers "staleness."

It is the almost universal testimony of thoughtful and intelligent men, who, during college days or later, have put themselves in training upon the old-fashioned restricted diet, with cake, pie, and all other sweet stuffs eliminated, with a limited supply of water, and excess of sweating exercises, that while it possibly increased their quickness and wind, it produced a feeling of nervous irritability, of tenseness, often accompanied by broken sleep, so that when it was over, they often felt, on the whole, rather the worse than the better for the discipline. This method of life and dieting is one of the reasons why over-trained athletes of any sort, college crews, baseball nines, football elevens, and pugilists, are apt to get into such an extraordinary state of nervous irritability and excitability, so that they begin to believe in hoodoos of various sorts, will break down and cry



like children after a defeat, or, if criticized too severely by the coach, will literally go off in the corner and sulk like a five-year-old.

I think it is also only fair to regard it as one of the important contributing causes to that spirit of bitterness and discourtesy, of hysterical determination to win at any price, which, though it is steadily diminishing everywhere, is one of the most serious blots upon the escutcheon of college and other athletics. Any one who has umpired a football game, for instance, toward the close of a season, will be ready to testify that half the players scarcely acted like men in possession of their ordinary senses, or were really responsible for their actions, and had to be handled and judged like spoiled children fighting hysterically over a broken toy.

The popular view of the close connection between fat and good nature and weight and balance is not wholly without rational foundation. Fat—unpleasant and stodgy as it is—is one of the most valuable tissues in the human body, and any man who reduces his share of it below a certain reasonable level not only takes the smooth edge off his temper and balance off his powers of judgment, but exposes all of his higher tissues, notably the muscular, nervous, and secreting, to danger of both starvation and disease. A moderate


cushion of fat is one of the best buffers and bucklers against the "slings and arrows of outrageous fortune," whether in the form of disease germs, or in strains upon endurance. The man who makes himself into a lean and hungry Cassius, even with the best of intentions, is very apt to get himself into a state of both mind and body where he is more fit for treason, stratagem, and spoils, than for comfort, wholesomeness, and a long and happy life.

Hardness, toughness and wiriness are excellent qualities in a flail, or a shoe sole, or a barbed-wire fence, but they are qualities of doubtful value in a living, breathing, red-blooded, self-adjusting, and self-repairing bread and butter motor. The man motor will run several hundred miles farther in his three-score and ten endurance run for carrying plenty of lubricator on board, even if it does take up room and add to the weight. Don't try to be too tough or too hard a citizen in any sense of the term. The tougher you are, the sooner you will dry out and begin to crack and let the little bugs of dry and wet rot, that are hanging about just waiting for a chance, into the leather, and everything that is hard is either brittle or liable to rust in the same proportion.

No leather or asbestos cloth ever invented will last half as long as the human skin, and no com-

bination of rubber or chilled steel can be devised which will run one-quarter the length of time that our muscle machine will. Every living tissue in the body must be kept alive and succulent, bulging and throbbing with nourishment, not desiccated and lean and tough, and no tissue in the body can be kept wholesome and long lived, from the skin to the brain cortex, unless it be supported upon, packed in, and permeated by fat. Nearly two-thirds of the entire bulk of the brain tissue is made up of a delicate nerve fat, lecithin.

Another thing to be watched in training is the tendency to concentrate too much upon the one particular feat which the athlete is going in for, or happens to be best at. The body works to an astonishing degree as a whole in even its most localized and specialized activities, and the curious fact has been repeatedly noticed by trainers of intelligence and experience, notably by Dr. Dudley Sargent of Harvard, that a man, for instance, who is training for the high jump, even after he has got himself in excellent general form and is beginning to concentrate upon his jumping feat almost exclusively, very quickly reaches a stage where he makes no appreciable gain and can just clear the bar at the same level day after day. If as soon as this high water mark has been reached, the jumper drops jumping altogether and goes



back into the general gymnasium for a course on the running track, the bars, the chest weights, with cross-country work, swimming, etc., for about a week, and then comes back and begins his jumping again, he will find that he has not only retained all his former power, but will usually be able to add another inch or inch and a half to the height of his leap. And this process will go on until his utmost limit has been reached.

So that even for the special feats and stunts of the athletic field the best preparation is a broad, general, wholesome, all round muscular training and building up of the whole body, and how much more so is this true of training for general vigor, adaptability, and endurance throughout the whole battle of life.

Another illustration of the close relation between great special skill and general athletic vigor and development is the frequency with which a man who takes first rank in, say, pole vaulting, or flat jumping, or even putting the shot, will take good second, or even higher, rank in some two to four other special athletic feats; the phenomenon of the all round athlete who can score a high record in two-thirds, or even all of the feats of speed, agility, elasticity, and skill, is by no means uncommon. The aim of all good and rational systems of training should be to develop a good

second or third rate all round athlete, who is neither muscle bound or stale, whose heart has never dilated, whose fat has never been all gaunted out of him, and who is ready to respond to any of the demands from a score of different directions that may be made upon him and his powers in actual life, and to conquer the emergencies with a sense of power and reserve in store.

This ideal has never been better or more closely attained as yet than by the so-called "gentleman's" system of living and training, carried out by the young Englishmen of the intelligent classes. The aim of it is simply to "keep fit" constantly, so as to be ready at any time at a moment's notice, dressed just as he stands, to walk ten miles, run two, swim one, row at a decent stroke for half a day, or play a hard game of tennis all the afternoon. The method of reaching this is simplicity itself; merely a series of daily acts—I dislike to call them habits, because the real path of health and the road to success is a broad and elastic response to an ever varying environment and all habits in themselves are bad signs of getting into a rut—which are both enjoyable in themselves and will promote vigor, efficiency, and happiness all through life. There is nothing strange or unusual about them; in fact, they are just good commonsense, rational, whole-

some living, such as all of us profess but far too few of us practice.

Begin on rising with a cold shower or tub bath, just as cold, but no colder, than can be comfortably reacted to with a sense of improvement and exhilaration. There is no merit whatever in either freezing or shocking yourself, making your teeth ache, or your finger nails blue, and if you do not warm up promptly and comfortably with an exhilarating glow and find your appetite for breakfast improved by your bath, raise the temperature of the water until you get these results. The proof of the bath is in the bather, not in the coldness of the tub. Your morning bath should be a delight to you, not a duty, and whatever temperature makes you feel best afterwards is the best temperature for you.

Then should follow a good substantial breakfast, no Continental subterfuge in the way of coffee and rolls, but a couple of slices of broiled bacon or a rasher of ham, with or without eggs, plenty of toast, or French rolls, providing you eat only the crust, followed by fresh fruit, cereals, jam or marmalade, with café au lait, cocoa, or weak tea. If you care to add any of the highly advertised brands of breakfast foods, well and good, but be sure and eat your breakfast first and let them come in afterwards where they really

belong, as fillings and trimmings. There is little foundation for the ancient belief in the peculiar wholesomeness of exercise before breakfast; in fact, it is much better to follow the homely philosophy of the inimitable Josh Billings and "if you have anything to do before breakfast, don't forget to get your breakfast first"; or, to echo the pithy question of Sidney Smith who, on being pompously ordered by his doctor to walk for an hour every morning on an empty stomach, promptly inquired "Whose?"

Don't begrudge the time necessary to take a good breakfast. There's little chance of your making a decent day's run unless you have plenty of fuel under your boilers to begin with. After breakfast should come half or three-quarters of an hour's brisk walk in the open air to blow the cobwebs out of your brain and get your heart beating regularly and your senses well waked up. Cut out the trolley or the train, for instance, and walk to your office, if this be within two miles, but don't overdo it, for although walking in the early morning, whether amid pearly dew and singing birds, or in the amber gloom of the morning sunshine struggling through banks of smoke and fog, is most exhilarating and refreshing, like early rising, it takes it out of you fearfully for the rest of the day, unless kept within very moderate

limits. Save your heaviest muscular exercise and longest ventilation period for the time between the end of your day's work and dinner.

In the office, shop, or work shop, keep the windows wide open, so as to work constantly in a moderate current of air, commonly known as a draft. Never mind your papers or drawings blowing about a little, a few paper weights on them are infinitely cheaper than the retained pressure which will come on your own brain and initiative from loading yourself with fatigue poisons which you cannot get rid of through either lung or skin in foul, stuffy air. If the soot and dust annoy you, don't shut the windows and stew in your own juice, but make it hot for your city council until they adopt some intelligent method of getting rid of the smoke nuisance and of the dust plague, both of which are, nowadays, perfectly capable of control.


Take a good substantial lunch, and at least an hour's nooning, better still an hour and a half, in the middle of the day; it will pay you good rates for the time invested in additional working power and superior clearness of head and steadiness of vision for the latter half of the day. You will even find it practically helpful to introduce that mild and harmless English practice, which we usually mention only with a pitying smile, the four



o'clock afternoon tea. It takes only a few minutes of time, but it clears the head and sustains the jarred and wrecked nerves wonderfully for the final cleaning up to get away for the day.

Shut up your desk in the evening in time to leave yourself at least one hour, or, better still, an hour and a half or two before dinner time, and put that time in, according to the season, in a three to five mile tramp in the open air, preferably with cheerful and congenial company, an hour in the gymnasium and swimming pool, half an hour of squash, or indoor tennis, three or four good sets of tennis, a game of baseball, or a round of golf. In summer time it is an excellent idea both to make the closing hour as early as possible, and to have a light picnic veranda or lawn tea, as soon as you reach home. Then spend all the remaining hours of daylight in the open air, and have instead of dinner a good cold meat supper, with plenty of fruits, salads and cooling drinks. If this can be served on a veranda or in the open air, or picnic fashion on the river or in the woods, providing the real snakes in Eden, mosquitoes, will permit, so much the better.

Round out the evening with any form of intelligent amusement, conversation, reading, music, the theater, games of the kind that require more than a spoonful of brains and don't need gambling to



make them interesting. This should be your mental playtime, when you do the things that you like and cultivate your own tastes and interests and, in consequence, is often the time when your best and most improving and lasting life work will be done,—the time that will quicken your imagination, broaden your outlook, and fit you for wider fields and higher usefulness. There is no particular merit in going to bed with the chickens unless you wish to rival the domestic fowl in brilliancy. No small share of the things that make for civilization and improvement are done after dark.

Stay up as long as you can find anything interesting to do, or until you begin to feel tired, so long as you turn in between the blankets in time to get at least nine hours' sleep before rising. No time spent in sound sleep is ever wasted, and most of us in this twentieth century take less sleep than would really be best for us. If you can increase that nine hours to ten and even eleven on Sundays and holidays, it will be one of the best and most rational beginnings that you can make for a day of rest and real recuperation. Even the additional luxury of a breakfast in bed, that keeps you in a state of placidity and perennial repose until eleven or twelve o'clock, is an excel-

lent and profitable way to waste time, whenever you have time to waste. As the ancient Arabic proverb hath it, "If thou hast a day to be idle, be idle for a day."

Don't forget to see that the windows, if possible on both sides of the room, are open at least a foot at the top and that the free air of heaven is blowing right across your face as you lie in bed. Put on plenty of covers to keep you warm, preferably in the form of cotton batting or light, porous eiderdown comforts, and you will be astonished how easily you can stand the temperature, even well down toward zero, in your bedroom during the night.

Such a method of training for life, continued through life, will not only insure the best possible degree of resisting power against disease, as nearly a perfect appetite and digestion as you are capable of, and as long a life as your inherited tendencies will permit, but also a wholesome, happy, enjoyable existence, every hour of which is well worth while, even if it were never to be followed by another. Live like this, and you will never know that you are old, until one day you are suddenly dead. In such a life if you want to go into training at any time for a special event or contest, or for a hunting trip, or canoeing expedi-

## 88      *EXERCISE AND HEALTH*

tion with long portages, or a walking tour, it will take only a few days of training upon any rational method to make you fit and ready for anything in reason and to do all that any man in his senses ought ever to aim for.

## CHAPTER IV

### OCCUPATION AND EXERCISE

**I**N the beginning, occupation and exercise were synonymous terms. The strenuous life was the common lot. You had to live it just to get bread and butter. It was a case of eat or be eaten. No one took any more exercise than he had to, because "*had to*" was more than enough. This was when the sentiment grew up that it was unhealthy to work between meals. Indeed, primitive man got nearly enough exercise at table, tearing his meals to pieces and worrying them down, to keep him in fair golf condition.

But we have changed all that with a vengeance, and civilized man may be divided, from the physical training point of view, into two great classes, one of which gets a great deal too much exercise in the course of his daily toil, and one which gets far too little. A few fortunate occupations occupy the golden mean, but even they are very apt to face, at some time of the year, or stage of their course, either the under-exercised, or over-exercised condition, often both by turns. The bread-winning occupations of civilization

have been organized, alas, without the slightest regard to their influence in promoting the healthy, harmonious, happy development, either physical or mental, of those who are engaged in them.

As matters now stand, there is scarcely a single individual, man or woman, who does not find it necessary to plan for some other form of muscular exercise to make good the lack, or balance up the one-sidedness of the exercise which they get in the course of earning their living. Perhaps some day we will realize that the most important product of any industry is the kind of men and women that it makes and plan our hours accordingly.

Of course, everyone admits at once that the man or woman of sedentary occupations and indoor habits of work needs a liberal allowance of outdoor exercise to keep in health. But it is not so generally recognized that the hard working day-laborer and artisan, the man in the blacksmith shop, the blast furnace, the quarry, or the saw-mill, is equally in need of a great deal of muscular exercise in the open air, in spite of the tremendous horse-power expended by his muscles every day in his regular toil. Paradoxical as it may seem, those who work hardest are most in need of exercise.

Some of our hardest working occupations show

a very high mortality from tuberculosis. Two of the most unmanageable and rapidly fatal cases of this disease that I have ever seen were in a frontier mail-carrier who rode forty miles on horseback every day, swimming from two to five streams en route whenever they happened to be in flood, and a "timber-cruiser," or field surveyor, for a big lumber company, who was perpetually taking month-long trips through the most inaccessible regions, with monotonous and often scanty food supply. Neither of them could get any vacation and they had almost forgotten the meaning of the word amusement.

"All work and no play" makes Jack not only a dull boy, but a sickly and short-lived one as well. It is hard to say which is the most powerful factor in producing a high death rate—excessive muscular work, or over-confinement. Certainly, occupations for both men and women, which combine the two—domestic servants and unskilled laborers—show the shortest life and the heaviest death-rate of all.

If a man wishes a long life and, what is still more important, a happy one, he must plan to spend at least two, and better three, hours a day in the open air, in light, active exercise of the nature of a game or sport, that gives him enjoyment. If he would plan for four, he would find

the additional hour anything but wasted. The same is equally true of women.

"But," says someone at once, "I am on my feet constantly every hour of the working day, either standing, walking about, running upstairs, handling books, or goods, and when night comes I feel as if the last thing that I wanted was any more exercise." This is particularly apt to be the attitude of busy housewives who declare that long before the end of the day every muscle in their body aches till they are ready to cry and resent, as arrant nonsense, any suggestion that more exercise would be of the slightest benefit to them.

Of course, in some of these cases, the best thing to do is to take the first ten or fifteen minutes of exercise on a lounge, or bed, so as to give all muscles a chance to relax and stop poisoning themselves. But after that, the apparent paradox is true, that the remedy for too much exercise is more exercise of another sort.

The hardest and most wearing exercise that the body can take is *to stand still*, and the next most trying is to sit still. Light, rhythmic, natural exercise is literally play by comparison with either of these wearing and unnatural strains.

The older physicists believed that the natural condition of matter was rest. Now we know that



its natural state is motion in a right line, and that it will perpetually continue in this, unless forcibly brought to a stand-still. Something the same curious reversal of apparent conditions is true of muscle. Its natural state is movement, not rest. Usually when it seems to be at rest it is pulling against some other muscle. When it is really at rest, it is neutralized chemically, or inhibited nervously.

We have all smiled over the man who rested so hard that it tired him, but this may literally take place with muscle. Eternal movement is the price of vigor; hence the singular fact, which we have long known as a matter of practical experience, but were utterly unable to account for, that three days' absolute rest in bed will tire a healthy man almost as much as a Marathon race and will actually cause the loss of more muscular strength and muscular substance than three days' mountain climbing. After a week's rest in bed, a man can barely stand alone. When we rest we weaken.

Nature's real recuperator of muscular vigor is not rest, but play, with such intervals of sleep as this brings. We are even finding that the quicker we can get our patients out of bed and get their muscles to working again after surgical operations, the quicker they recover and the firmer the wound heals. Many surgeons nowadays try to

have their patients sitting up and, if possible, walking about within forty-eight hours after a major surgical operation, such as for appendicitis, or an ovariectomy. Except in special cases, twelve to fourteen hours is about the limit of time that a healthy individual, no matter how much fatigued, should lie in bed. Prolonged lying in bed wastes the muscles like a fever and will even cause a rise of temperature in perfectly healthy individuals.

This is a curious state of affairs and one which we are not entirely able as yet to explain, but this appears to be the drift, so to speak, of the situation. The normal condition of all muscles in the body is one of constant, rhythmic contraction and relaxation. We thought at one time that the heart muscle was an exception in this respect and spent much valuable time and many beautiful adjectives in marveling at its wondrous power of beating steadily on, never tiring, day and night. But it was soon found that all the muscles in the body of many invertebrates, such as the jelly-fishes and sea-anemones, had this curious power of rhythmic pulsation.

About fifteen years ago, our modern wizard of science, Loeb, showed that by simply immersing one of the body muscles of a warm-blooded animal in the proper salt solution, it too would start

beating rhythmically and keep on indefinitely as long as a certain tonicity of the solution was maintained. In other words, to put it very roughly, our whole bodies are hearts, beating and throbbing day and night, whether we lie, or sit, or stand, or run.

This threw a flood of light on the long known fact that all our body muscles, for instance those in our legs and arms, never entirely relaxed during our waking hours, or even in sleep, but remained in a state of what was known as *tone* or *tonic contraction*, found to consist of an exceedingly rapid succession of tiny, imperceptible contractions. In other words, our body muscles are really contracting incessantly day and night, and producing fatigue toxins, though in small amounts. When we exercise them, while we increase the size and range of their contractions, yet the net amount of this increase is not so great as would at first sight appear, for much of it is merely a change in form of the work done by the muscles, or throwing it alternately, first upon one group of muscles, and then on another, with corresponding intervals of rest and relaxation for both groups.

On the other hand, to counterbalance the greater amount of work done and poisons produced, we have a weighty practical offset. While

the body is lying perfectly still, every ounce of work involved in the circulation of the blood and of the lymph has to be carried out, alone and unaided by the muscles of the heart and of the walls of the arteries. The moment that active muscular movement of any sort begins, the whole body literally becomes a heart, the muscles by contracting pump out of themselves the blood and lymph and at the same time, by pressing upon the veins, drive the blood on toward the heart. All our veins, of course, are provided with a close succession of valves in their interior which prevent the blood from flowing in any other direction than toward the heart. In fact, it has been estimated that from one-third to nearly one-half of the total force expended in propelling the blood around the body is contributed by this syringe-squeezing action of the voluntary muscles.

It is evident, then, that this "underground," or subliminal, incessant contraction of the muscles, which goes on even when the body is apparently at rest, while it produces only small amounts of fatigue-toxins, may result in even larger accumulation of these poisons in the muscles than active exercise, on account of the stagnation of lymph and blood, both local and general.

The only really healthy and natural state of man or woman—to say nothing of children—is

neither sitting, nor standing, nor lying down, but on the run! This is why play is literally, not merely recreation, but *re*-creation.

The same piling up of poisons may occur from a monotonous series of movements involving only a single group of muscles, or a single limb, especially if these are carried out in a cramped and unnatural position. Such movements as the incessant use of the pen, of certain tools, or the up-and-down working of the foot and ankle upon a treadle, or the monotonous manipulation for hours at a stretch of some drill, handle or lever are far more fatiguing and injurious than generalized, symmetrical, swaying movements of the whole body and limbs, which involve the expenditure of from two to ten times as much actual strength. The reason is that the former fatigue to the torture point one small group of muscles, keeping all the rest of the body on a strain to hold this tiny group in the right attitude and position, while absolutely failing to give any opportunity for washing out the poisoned lymph from the muscles, or for its proper driving through the general circulation and lungs and liver. The best cure and rest for the fatigue of a factory-operative, for instance, unless so excessive as to be absolutely exhausting, is a good brisk game of base-ball, or prisoner's base.

---

It must also be remembered that there is a very large amount of unconscious and, for practical purposes, utterly useless muscular contraction going on all over the body, while one small group of muscles, or a hand, or a foot is engaged in some special task, especially if it be one of some delicacy or difficulty. Just look, for instance, at the muscles of the body of a school-boy endeavoring to make a clean copy of a writing exercise, in the early days of life when writing is a high and arduous task. His mouth is screwed up into a knot, his brow contracted in a frown, his tongue thrust out, his other hand firmly clenched, his knees drawn up under the desk, his back bowed over and twisted to one side, as if he were getting ready for a one-sided attack of tetanus, and every drop of energy in his body is fiercely concentrated upon that wretched and unmanageable pen point.

If you think you have outgrown that sort of thing in your superior wisdom and maturity, just stand before a mirror and watch what your left hand is doing while your right hand is shaving. Or let someone drop a hand gently upon the muscles of the back of your neck, or the small of your back, while engaged in that interesting occupation and see if he does not find them as tense as telegraph wires.

No matter what your occupation, how many, or how few muscles it involves, you are exercising a far larger number of muscle-strands than you have any idea of and, for the most part, in such a way as to do you no good and them harm, unless the exercise be of a nature to allow of frequent, rhythmic, undulating changes of movement, position, and attitude of the entire body, or large parts of it.

Another most important thing to be remembered is that we, as human beings, pay a special and heavy price for that erect position of which we are so proud, in the form of an entirely new muscular strain of a severity and excessiveness suffered by no other animal. We do not *stand* upright; we merely keep ourselves from falling for brief periods at a time. We do not *walk* upright; we merely make a series of pitches or plunges forward and then catch ourselves before we strike the ground and jerk our bodies back into a temporarily erect position.

Every attitude that we assume is an active one as far as our muscles are concerned. Paralyze our muscles when we are standing erect, and down we go in a heap, like a wet dish rag. Paralyze the great muscle-ropes of our backs or abdomens when sitting, and we shut up like a jack-knife. Nay, even when we are lying stretched out in

bed, we are calling constantly upon these muscles, and if they were to fail to respond, we should curl up in a bunch in the sag of the mattress.

This actually occurs in the very last stage of serious and exhausting illnesses. The patients' heads and shoulders cannot be kept up on their pillows, but collapse down into the middle of the bed, until their chins literally touch their knees. It is no uncommon thing for nurses to have to make rounds every hour or so to straighten out collapsed, or paralyzed, patients into even the semblance of a human figure.

This is why the hardest of all work we can do is to endeavor to stand erect without moving, or even with such limitation of movement as would accompany toeing the line, or keeping the feet within a circle two feet in diameter. This fact has been pounced upon by martinets of all ages as one of the most disagreeable and exhausting punishments, short of actual chastisement, that can be inflicted, particularly upon the young.

When it comes, however, to such a degree of immobility as is involved in remaining absolutely rigid, without apparently moving a single muscle like sentinels standing on guard or wrestlers posing for living picture groups, the feat becomes a positively Herculean one. Even the strongest and most vigorous of athletes will have great dif-



ficulty in maintaining their pose for forty seconds.

During the lying-in-state of King Edward VII in Westminster Abbey, it was considered desirable, for some characteristically idiotic ceremonial reason, that the grenadiers at the head and foot of the coffin should bow their heads and stand motionless as statues in a grief-stricken attitude. It was supposed that this could easily be done for fifteen minutes at a stretch, but several out of the first two or three couples of men fainted and fell headlong, and it was actually found necessary to change the guards every three minutes in order to enable them to stand the strain.

It cannot be impressed upon us too vividly that we maintain all our postures, standing, walking, or sitting, not like a chair or a table, but like a bicycle, or a gyroscope, by virtue of incessant movement. We don't stand by an effort of the will, or by mechanical balance, like a bottle, or a nine-pin, but by innumerable oscillations from one side to the other, or backward and forward or both, each of which corrects the other and enables us to hold a middle course.

When we walk or run, our motion is not straightforward like an arrow, but in a series of rocking, concentric curves from side to side, which, if we move slowly enough, or are broad enough across the hips, shows itself clearly as a

clumsy "waddle." An easy, swinging, elastic walk, or a bounding, springing run are a positive rest compared with prolonged standing at a desk, or even sitting in the rigid position often required for indoor work, with little opportunity to swing the limbs, or bend the back.

The man who is well fed and in vigorous health will actually walk behind the plow, or swing an axe, or a hoe, all day long with less muscular strain and less danger of self-poisoning than if he stood all day at a counter or desk.

Another muscular strain which is a penalty for the proud privilege of being *homo erectus* is that of the muscles and tendons of the feet. The human foot, like the human back, buttocks, and nose, is almost unique in the animal kingdom. The support of the quadrupedal body is a comparatively simple affair. Every school boy, of course, knows that it is merely a matter of "one leg at each corner." Each leg is a jointed prop which, when set in a straight line, requires relatively little muscular effort to keep it rigid, and the foot is simply the last section of the leg prop. So little effort is required to prop a quadruped up that many animals, like, for instance, our friend the horse, lie down only two or three hours out of the twenty-four, and don't sit at all. Some of them, like the elephant, sleep habitually

on their feet, and have been known, in captivity, to stand for years without ever lying down. Many animals, in fact, habitually sleep standing, but the human species has entirely lost this power.

Each foot of the human biped has literally to do the work of two feet, not only supporting the body at rest, but also prying it up off the ground and pitching it forward when we desire to move or run. We stand supported upon two curving arches of bone, each reaching from the ball of the foot to the heel; and the curve of each arch is supported, not by bony or stony blocks of key-stone shape, but by the incessant and elastic pull of muscle. Standing still tires out these muscles that support the arch far worse than walking does, and flat-foot, or the breaking of the arch, is one of the most painful and crippling lesser defects to which the human body is subject. It is produced by standing and so-called sedentary occupations upon hard floors, at least ten times as often as it is by outdoor work, unless this latter involves the carrying of heavy weights in early life.

Those most liable to flat foot are employees in stores, shops, banks, and offices; nurses, domestic servants, and over-worked housewives; in fact, all those whose occupations involve much confinement indoors, with poor muscular development, bad air,

and periods of prolonged pressure, even without heavy strains upon this muscle-slung arch of the foot. The best and, indeed the only, ways to avoid it are to make the work more varied, so as to involve more walking about, or climbing, and less mere standing still, and to take plenty of vigorous and enjoyable exercise in the open air, such as walking, golf, tennis, base ball, dancing, skipping the rope, or hockey.

We used to attempt to cure this defect by mechanically supporting the arch of the foot with a curved piece of metal in the instep of the shoe, but while this is a temporary help, permanent cure can be produced only by systematic massage and vigorous exercise of the muscles of the calf and the front of the leg, so as to give them strength to resume their natural support of the arch.

Next after sedentary indoor occupations and prolonged standing, the most fertile producers of flat foot are narrow, cramping, or fashionably misshapen shoes, which prevent the arches of the foot from expanding naturally, make walking a torture, and cause the supporting muscles of the leg to atrophy from lack of regular use.

A very considerable percentage of the physical breakdowns among nurses and saleswomen are due to this painful giving way of the arches of the

foot, from failure of the supporting muscles due to insufficient out-door exercise.

In fine, there are very few occupations of civilized life, and particularly of city life, however mild and confining on the one hand, or strenuous and out-of-door on the other, which do not require, as a corrective, a considerable added amount of light, rhythmic, pleasurable exercise, play in fact, for the maintenance of health and efficiency. This involves, of course, two things, both of which are difficult—shortening of the hours of work and a constant and vigilant determination not to allow society, nor convention, nor fashionable apparel, nor the weather, nor the season, nor snow, or mud, under foot, nor storm or fog overhead, to interfere with our regular play periods. We should be as punctual about, and as insistent upon, them as we are upon our meal times, or our hours of sleep.

Shortening the hours of work is of course, difficult, and for the majority practically beyond our control, under the present senseless and wasteful method of conducting our business and industries without the slightest reference, not merely to the comfort and reasonable enjoyment, but to the health and efficiency of those engaged in them. There are few things we do as stupidly and unintelligently as work, and some day it will dawn

upon us that the best way to get the largest output of the best quality of work is to feed and recreate and rest and condition the workers so as to develop both their bodies and minds to the highest possible pitch of clearness, efficiency, and power.

The best way to make a success of a business is to get the highest possible class of ability, enthusiasm, and vigor in its working force. Some day perhaps we shall be enlightened enough to make it our aim to get out of each individual the highest and greatest amount of productivity of which he, or she, is healthfully capable, in the shortest possible time, whether this be twelve hours a day, or six, instead of, as at present, simply chaining them to the desks or looms for as many hours out of the twenty-four, as the law will allow, or their poverty enable us to demand.

In the meantime, while we are waiting for the dawn of the millennium of common-sense and humane feeling, if all those who are able in any way to control their hours will shorten them to that length which coincides with their highest efficiency, by giving plenty of time for wholesome, life-giving enjoyment out of doors, their example will help mightily. After a time, the benefits which they would experience might suggest to those of us who employ others that it would be a good thing to pass on down the line.

From the point of view of exercise requirements occupations may be divided into two great groups; the first, in which the occupation itself involves a very considerable and often excessive amount of muscular exercise of various sorts; and the other in which the amount of exercise involved is far below even the minimum which is possibly consistent with the maintenance of health. Of course, there are many which are intermediate between the two.

The first, or over-exercised, class need more exercise for two main reasons; first, and most important, because the time devoted to light and rhythmic exercise in the open air shortens the time devoted to grinding, straining, over-taxing labor at their trade; second, because, as is the perpetual lament of all physical instructors, trainers, and gymnasium experts, very, very few gainful occupations, however vigorous the muscular effort they necessitate, develop men symmetrically and wholesomely.

One will over-strain, for instance, the muscles of the arms and back and do little or nothing for the legs, abdomen, and front of the chest.

Another will develop to the point of abnormal hypertrophy one arm, or one limb, or one side of the body. Others involve an intolerable monotony of slight, rapid movements of a hand or foot, or

even finger, or thumb, hundreds of times in a minute and thousands of times in the day, without the slightest strain upon, or interest for, ninety-nine per cent of the muscles and of the mind. The more laborious, cramping, and fatiguing these occupations, the more they demand good, wholesome, romping play as an antidote.

Men and women who are not, in the ordinary acceptance of the term, worked very hard, from the point of view of muscular energy, but are kept constantly moving about on their feet, from bench to counter or from loom to loom, or even in such outdoor occupations as collecting fares on a street car, will find their best protection against over-fatigue and breakdown in from one to two hours daily of relaxing, enjoyable play in the open air—hand ball, baseball, tennis, dancing, or skipping the rope.

Other groups of heavy muscle-workers require play in addition to the exercise involved in their toil for a somewhat different reason, and that is to develop otherwise unexercised and unused sides of their emotional and mental makeup. The farmer, and particularly the farmer's boy, who works hard at a wholesome variety of occupations, under ideal surroundings as to air and sunlight and with usually good food and fair opportunities for rest, is just as much in need of play as is the



bank clerk, or the floor-walker, for the purpose of developing the communal and social side of his nature, bringing him into contact with his fellows, broadening his outlook upon life, and enabling him to keep up his enthusiasm for, and interest in, his solitary and monotonous toil.

In the old days he used to get this needed relaxation and social intercourse through husking bees and quilting parties and apple-parings and harvest and threshing festivals. But as these have gradually died out with the introduction of machinery and specialized methods of farming, something else must be introduced to take their place. The baseball nine and the foot ball team and the dancing club, and even the golf club, the bowling alley, and the tennis club are now just as vitally necessary and important in the country as in the city and suburbs.

Indeed, absurd as it may sound, a Country Club is as necessary for farmers as for over-housed Wall Street men. Now that farmers are putting brains into their business, they are coming to recognize this fact, and I have actually heard of one place in Kansas where the establishment of an Inter-county Golf Club is under consideration, to which several of its most enthusiastic agriculturalist supporters purpose to come twenty miles in their automobiles.

---

As for the slaves of the loom, the counter, the factory, the cook stove, and the school room, their vital need of exercise is as undisputed and as obvious as the law of gravity. Within twenty-five years I prophesy that the work of the world will be so re-arranged as to allow for play times as inevitably and as much as a matter of course and right as it now does for meal times.

The shrewd old medieval proverb, "Meat and mass hinder no man's journey," should be revised to read, "Meat and play hinder no man's work." Instead of play giving us a distaste for work, as the lying old creeds of the ascetic and the Puritan in all ages have taught, proper and reasonable opportunity for recreation will make the hardest life-work as attractive as play.

The best work that even the most grad-grind of us do is work that we do because we love it, even as if it were play. The greatest problem which is facing the modern statesman, the thoughtful humanitarian, is whether the great and important work of the world shall be performed by the mass of toilers, healthfully, cheerfully, happily, or whether it shall be carried out, as too much of it now is, as a grinding, health-destroying, intolerable, monotonous task, stunting development, strangling hope, and murdering joy.

It is not just work that produces this unhap-

pininess and ill-health, this gray and cheerless monotony and hopelessness, but the senseless, selfish, hide-bound, and precedent-shackled manner in which our self-anointed leaders insist that the work must be done.

It is not too much to say that all the valuable, productive work now done in the world could be accomplished without working anyone more than an average of six hours a day, leaving the balance of our working hours for healthful recreation and the intelligent development of our highest and happiest powers.

It is not play that impels to drink and dissipation, but work! Two-thirds of our vices are pitiful and distorted efforts to get, by oblique and unwholesome means, that opportunity for joy and emotional expression which is denied to us where we ought most to be able to secure it—in our life-work.

As for those eighteen millions of our future citizens whose occupation consists in confinement at hard labor within the walls of the school-room for five hours a day, no one now denies their need of, and right to, play. Play indeed is their chief business up to fifteen years of age and their proper avocation for five or six years longer. Their most important and vital need during their eighteen to twenty-three years of growth is to develop

to the highest pitch those powers and possibilities which were born in them. And play will promote growth, which, after all, is the most important thing in the world—far better than any yet invented system of education.

In so far as the school-room interferes with symmetrical, healthful growth—which is as inevitable and irrepressible mentally as it is bodily—in so far it is an evil and a nuisance and should be abated. Give children plenty of play, plenty of food, plenty of fresh air and sleep, and answer half their questions, and there will be little need to worry about their formal education.

Of course, it goes without saying that rhythmic, vigorous, joyous exercise in the open air is just as necessary for women as for men, for girls as for boys. There is nothing like a couple of hours a day in the flower garden, on the golf links, on the tennis court, or in a canoe, for keeping the over-worked housewife, the responsibility-laden mother, clear in the head, sweet in the temper, and tireless in well-doing.

The instinct of the unspoiled young human animal will take care of this matter if we only give it scope. Girls are just as keen to run and romp and swim and wrestle and climb trees as boys are in the first decade, and it is far more the purblind intelligence and hen-brained tyranny of Mrs.

Grundy with her corsets, her skirts, her high-heeled shoes, and her petty hoard of maxims anent "lady-like" conduct, that check and thwart this tendency in later life, than it is any physical, or physiological, sex differences. A woman requires somewhat less exercise to keep her in health than a man does, and her natural tastes lead her into somewhat less violent and strenuous forms of games and sports, but she needs her modicum of exercise to keep her in health of body and balance of soul, just as vitally and as indispensably as a man does.

Tennis and town-ball and hockey and golf and skating and running and dancing are fine arts and appeal to the sense of beauty and our esthetic emotions just as truly as, and even more strongly than, music and drawing and fancy work, and are at least ten times as wholesome, both mentally and physically.

If we could restore and revive something of the old Greek standards of beauty, of art, and of distinction, we should do more to make the lives and development of the better half of the race wholesome, symmetrical, and happy than by any other possible means.

Get rid of the false and cowardly asceticism that our religions have been preaching for twenty centuries and dare to live and enjoy life. A re-

turn of the grand old Greek joy of living, the  
spirit

“That with a frolic welcome took  
The Thunder and the Sunshine”

would be as healthful for our minds and our  
morals as for our bodies.

## CHAPTER V

### THE REAL DANGER OF ATHLETICS

**A**N athlete is like an aeronaut—safe enough while going, but in danger the moment he stops, especially if he stops suddenly! There was a world of shrewd athletic philosophy in the words of *Darius Green* of the immortal “Flying Machine”:

“Wall, I like flyin’ well enough,  
But it ain’t such a fearful sight  
O’fun, when you happen to come  
to light.”

Thus unconsciously plagiarizing the sentiment of an earlier Greek aviator, who explained that falling was pleasant enough, but it was the sudden stop at the bottom that hurt you.

If the first great danger of athletics for the professional, or business man, the brain-worker and man of sedentary habits generally is not getting enough of them, the second is like unto it—stopping them too soon. No little of the bad after-effects so frequently ascribed to athletics in college and school life is really due to their sudden discontinuance after graduation.

The idea seems to be that athletics are either

among the frivolities and enjoyments of the springtime of life, which the grown man with his serious interests and weightier cares can dispense with, or else that, while useful and valuable in developing the body during its growing period, when once full stature and mature vigor have been attained, there is no longer any need of this sort of kindergarten work. The building is finished, throw away the trowel and the hammer, as if no additions or repairs would ever be needed. In the quaint German phrase, we may "throw away the baby with the bath."

The building of man is *never* finished, until he is dead. His life is all in one piece, and what is good for him at one stage of his existence, is, *mutatis mutandis*, good for him in all. While man's mere stature and gross weight, and even "horse-power" may have attained their maximum by twenty-two or twenty-three, the *efficiency* of both his mind and body, for his particular life-work, ought to, and under most circumstances does, go on steadily increasing until he is fifty, fifty-five, and even sixty years of age. And the same health-giving agency—exercise in the open air—which has been the very life secret of his *structural* growth and development, is equally indispensable to his further *functional* development and growth in efficiency. We not merely limit



our growth, but actually shorten our lives by taking it for granted that we have reached our limit at a certain age or stage, and may, therefore, drop the means of further progress—play in the open air. When we stop playing, we stop growing!

Play is just as necessary to keep a grown man young and a middle-aged man from growing old, as it is to make a child grow into a man. Wordsworth's lines are as sound physiology as good poetry:

“My heart leaps up when I behold  
The rainbow in the sky;  
So was it when my life began,  
So be it when I am a man,  
Or let me die.”

In childhood we play because we are young; in middle life we are young because we play, and if we keep it up we shall never know that we are old until we are one day suddenly dead. Yet the absurd idea has grown up, and Mrs. Grundy has adopted it with her usual fatuousness, that play is something undignified in a grown man and unbecoming in a lady. And this, unfortunately, is one of the rare instances where “thinking makes it so.” After a man has practiced this belief in the uselessness of exercise for half a decade or so, and become fat and pompous and red-faced, or pale and slack-muscled and short-winded, then

the contortions that he indulges in when he decides to unbend and try to play furnish considerably more entertainment to spectators than to himself.

Free, enjoyable, health-giving play is, of course, impossible in the straight-jacket livery of civilization, whether it be the stiff hat and high collar, cast-iron shirt front and patent leather shoes, which the tyranny of civilization has riveted upon the male adult, or the steel-ribbed corset, the thirty-six-inch hat, the crippling skirt, and the back-breaking, high-heeled shoe, which the grown female has been melted and poured hot into. After they have worn this harness ten or fifteen years, both sexes are afraid to leave it off—for they know what they would look like without it!

Every line of the human figure should be alive, flowing, changeable. Whenever we try to *fix* it—well, we fix it! As our Indian wards say, “fix it plenty.” The less we do in the way of “improving” our figures, the less need they will have of improvement. Take care of our play, and our figures will take care of themselves! No use trying to wean the business man from his cutaway and silk hat, or the dowager from her corset and veil, for they would both be about as helpless and presentable without them as an oyster without its shell.

The human figure should be an outward and visible sign of an inward and muscular grace, and not the product of the tailor, or the mold of a corsetiere.

Weight is no obstacle, bulk is no bar to gracefulness, providing both are firm, mobile, elastic, and vigorous, instead of being deposited in shapeless lumps, or in sagging bunches.

How often have we seen the distressing metamorphosis of a vigorous, fresh-colored, athletic young college man, or farmer's boy, into a fat and sluggish-livered, or pale and stoop-shouldered, office prisoner, chained to his desk or table. Generally the more vigorous and thoroughly trained a youngster is, the slower this change is in coming about, but sometimes, unfortunately, the reverse is the case, and the descent from full vigor and bounding energy to the "fat and scant-of-breath" stage is even more rapid in men who have won athletic honors than in those of more studious and sedentary habits.

Hence the impression in some quarters that it is an advantage to begin to get into sedentary habits while young, so as to break yourself in for the confining routine of business and professional life. But precisely the reverse is true, and as the best cure for that little knowledge which is supposed to be a dangerous thing is more knowledge,

so the best preventive of any injurious reaction from athletic habits in young life is more athletics after maturity.

The studious and slack-muscled youth will find the change from college to business life less striking and appear to suffer less thereby, but that is simply because he never lived and worked at the high level of vigor and efficiency of his more athletic fellow-student. And unfortunately a higher level is a place to fall from as well as a plane to continue on. The only man who need fear a fall is he who has had the courage and energy to soar.

What we need is a change which will enable our boys and young men to maintain the vigorous, bounding, joyous efficiency of their college and school days, as nearly as may be all through their working lives, a change chiefly in social conventions, in business and public etiquette, and in ideas of propriety and becomingness; just to get rid of that ridiculous old Puritanic notion that play is a sinful gratification of the lusts of the flesh, unnecessary, undignified, and unbecoming in a staid and sober citizen.

We need University extension courses in play for grownups to teach them how to play and make the habit fashionable among them. Anyone who does not play and who is not frequently seen playing in public should be regarded with suspicion,

as only "fit for treason, stratagems, and spoils." The golden text of the New Gospel is: "By play ye are saved."

It is never safe to drop athletics, but to stop them suddenly is especially dangerous. Health has its "hang-overs" as well as dissipation. The habit of vigorous, muscular play and outdoor life causes an appetite and habit of enjoyable eating to correspond, and this lasts and persists by its own momentum after the conditions which produced it have ceased. Hence, our ex-athlete, starting in business joyously and contentedly, eats from ten to twenty per cent. more food fuel than he can burn cleanly in his muscle furnace. This must either be disposed of by reductive and eliminative processes in the liver and kidneys, which throws an undesirable strain upon those organs, or stored up in various parts of the body as fat. If the body opens the liver and kidney switch to dispose of this surplus, then it is pretty certain that before long the blood will become loaded with food clinkers and half-baked urea, and the quondam quarterback will become headachy and bilious and dumpish, begin to lose his appetite, and discover for the first time in his life that he has a digestion.

If, on the other hand, the body chooses to dump the surplus in the form of fat, then this is

apt to become a source of annoyance. For although fat is an excellent thing in its place, that place is usually somewhere else, or on somebody else. It is deposited in cushions over and between the muscles, making their already scant and insufficient exercise more difficult and less effective. It accumulates upon the abdominal wall and under the *peritoneum* and between the folds of the *mesentery*, interfering with breathing and clogging the free, peristaltic movements of the bowels. From a man who is merely prevented, by force of circumstances beyond his control, from taking the exercise he longs for, the ex-athlete becomes first indifferent, then averse to exercise and finally to regard it as a thing to be avoided at all hazards.

But these are not the only undesirable processes going on in his idle body. The extra size and vigor of his muscles, which he has built up with such skill and care, and the additional bulk and thickness of wall which exercise has given to his heart are now no longer necessary to meet the tabby-cat demands made upon them by his sedentary life. Nature is above all things an economist, and sometimes, like most economists, does not mix much brains with her economy. She promptly proceeds to cut down this superfluous and unnecessary bulk in both muscles and heart, and as the only way that she knows of getting rid

of protein is to turn it into fat and then burn that fat to carbon dioxide and water, she sets this process in operation now. The inevitable results are first that more fuel is thrown into the already overloaded furnace and, what is more significant and dangerous, a process of actual fatty degeneration is set up in both muscles and heart. For some reason which we do not as yet clearly understand, this process, initiated for perfectly normal and healthful purposes, appears to be in danger of not knowing where to stop.

At all events, it is a painfully familiar experience to find the large, hypertrophied, powerful heart of the athlete reduced within a few years, apparently by this process of surplus-burning, fatty decay, to a really alarming state of weakness and inefficiency. If all goes well and no accident or emergency occurs, even this state of affairs may gradually reach a balance and the heart get rid of its fatty, degenerating muscle strands and shrink down again to a pump of pure muscle, smaller in size and thinner in wall, "fitted to its petty part."

But should any acute infection strike such a heart in this dangerous transition process, while it is, so to speak, "swapping horses in the middle of a stream," then the organ may find itself unable to rally to its own defense and be suddenly

crippled for life, or even go down entirely in an attack of acute heart failure. Though it is **not** generally known, most of the acute infections of young adult life, such as typhoid, pneumonia, and tuberculosis, kill by the heart, which sinks overwhelmed under an accumulation of their virulent toxins.

This is one of the reasons why we have two or three times almost every season such painful newspaper publicity of the fact that some famous oarsman, or center-rush, or shot-putter, who has lapsed from the clean, hard vigor of college life into the foul-air desk slavery of business, or professional, life has suddenly died of typhoid, pneumonia, or tuberculosis. Paradoxical as it may seem, such a man after so sudden a change of his very life conditions, may be in even worse condition to resist a surprise assault upon his body fortress than if he had never gone into training. He is withdrawing his army, as it were, from a high plateau to the plain below, through a narrow and rocky defile, and a sudden assault may throw him into hopeless confusion, or cut his forces completely in two.

The only way to fight this danger is to stay on the higher level of living and energizing, and the best way—Prof. William James to the contrary notwithstanding—to live upon a high level



of mental energy is to maintain a high pitch of muscular energy and freshness.

The best of all ways to lengthen our days is not as Tom Moore declared: "To steal a few hours from the night," but to lengthen the period of our youth. Why should youth, and with it growth, stop at any fixed and arbitrary period, either chronological, social, or economic? Let the boy keep on being a boy as long as he possibly can—it will make him a happier, healthier, and better man in the long run. Let the grown man get rid of that foolish conventional fear of playing and frankly enjoying himself in the open and in public. The longer you continue your first childhood, the longer you will postpone your second. In fact, with good luck, you may avoid it altogether, and go out as suddenly and as cleanly as an electric light when the current is turned off, instead of guttering smokily down to the socket like a tallow candle.

One of the happiest and most promising signs of the times is the appearance of the word: "GOLF," in large, legible letters upon the regular schedule of the working day of the successful business man. It is significant of much, and all of it good. Twenty years ago the average, hard-headed captain of industry would have been simply aghast at the thought of wasting golden

hours that might have been spent in building up his Sacred Business in mere, unprofitable sport in the open air. The man who openly refused to make business engagements after three o'clock in the afternoon because he wanted to play golf would have been looked upon as little short of crazy. He must be delighted to take every opportunity of making new money, that came to him up to 6 P. M.—indeed eager to rush downtown again after supper to meet opportunity at the front gate, or lose caste at once as a business man.

If he indulged in any open-air sport at all, it must be strictly *sub rosa* and well out in the country where none of his customers or clients could possibly see him; and he must leave word at his office that he was detained by an important engagement out of town. As a special indulgence, he might go to the races two or three times a year, or to a baseball game, not oftener than once a week, in the summer time. One natural and inevitable result was to increase the popularity of hard drinking, high playing, and vaudeville as the favorite sports and amusements of business men. They were the only things that they had either time or brains for in the fagged-out remnants of the day, which their arduous business hours left them.

Twenty years ago the recent graduate who had

won his sheepskin and was starting out on his career in life, whether commercial or professional, who attempted to continue in his new environment his established habits of tennis and baseball and football and rowing and fencing would find himself promptly taken aside by some anxious mentor and informed that "he must drop all these baby games and that sort of darn foolishness" if he ever hoped to acquire a reputation for solidity and trustworthiness.

"Why, if one of your patients were to come by and see you in those tennis flannels," said a gray-headed surgeon to a young colleague of mine, "he'd never call you to a serious case again as long as he lived. That sort of foolishness is all right for boys, but it will never do for men who have to take the responsibility of other people's lives on their shoulders."

And the old gentleman simply reflected the general sentiment of that Middle-Western community. We have left that stage pretty well behind us, thank Heaven, but there is still room for further improvement.

One of the secrets of the wonderful vigor and vitality of the English nation is their attitude toward sports and games in the open air, not merely in childhood and in youth, but through all ages, down to the very end of life. The boy

who has become a cricketer, or a football player, or an oarsman, or a cross-country runner in his school or college, goes right on with his practice and his matches when he starts into business and professional life and plays just as hard and almost as regularly in the long summer evenings and on his religiously observed Saturday half-holidays and Sundays at forty as he did at fourteen.

There are almost as many cricket, hockey, rowing, fencing, and other athletic clubs in England the majority of whose members are over thirty-five, as there are of those under that age. The youngster, taking up his life work, joins one or more of these clubs in his new town or neighborhood, just as much as a matter of course as he joins his church or his Y. M. C. A., or Literary Club, or Lodge. If he has been successful in "making" his school cricket team or crew, he sets out to win a place upon his county team.

Not only does a young fellow's athletic life not stop at twenty-two or twenty-three, but no one is expected to do his best, in any form of team athletics, under thirty to thirty-five, and far the best played and most eagerly attended championship games of cricket, of football, of tennis, and the greatest rowing matches are those between Middlesex and Surrey, or North and South, or English and Scotch, or all England and Colonial

teams, or crews made up chiefly of men from twenty-five to forty-five years of age.

One of the best-known cricketers of all England, for instance, was, for fifteen years, until he retired voluntarily at the age of fifty-four, a doctor of good standing and lucrative practice, whose patients were perfectly willing to grant him a three months' summer vacation to play the National Game for the sake of having such a distinguished and highly respected individual as their family physician, during the remaining nine months.

So far from known and recognized skill in athletics being a drawback to young professional men, there can be no better introduction to desirable patients and wealthy clients for a young doctor, or a young lawyer, than a place on his county cricket or football team and the reputation that goes with such an honor! The whole country for miles around London, or any of the larger cities, is fairly peppered with cricket creases, golf links, lacrosse and football fields, and hockey grounds; and on Saturday afternoons groups of energetic, white-shirted players are far more numerous than cattle and sheep.

They are not half so particular or hard to suit as our American gilded youth in regard to flawless turf and rolled levels and perfectly graded

grounds. Any stretch of pasture land which is level enough to plow and big enough to stick two goal posts in, will serve them for football, hockey, or lacrosse; and those who cannot afford a field, form themselves into harriers' clubs and chase human hares by paper scent across country, or along the lanes and foot paths.

Even if the Duke of Wellington did not say that the battle of Waterloo was won on the cricket field at Eton, the basis of England's century-long triumph of colonization and world empire was unquestionably laid upon her evergreen turf, across the rough, sedgy sward of her greens and commons, and among the heathery tussocks and gorse of her heaths and moorlands.

This admirable fashion is, fortunately, spreading rapidly in this country and almost every town that has a good opinion of itself has its golf links, its Country Club, and its public grounds in parks or elsewhere, for baseball, tennis, football, or lacrosse. The rapid and universal spread of the vacation habit and the increasing tendency all over the country and among all classes of society to acquire summer camps, cottages, or homes, ranging from the rudest and most primitive to the most elaborate and expensive, is also a most encouraging and hopeful sign for the future vigor and happiness of the race.

For a long time our more rigorous winter was looked upon as an almost insuperable obstacle to all-the-year-round athletics, but now that we have deliberately set ourselves to utilizing them, we find that its frost and snow have almost as many compensations as drawbacks, from their exhilarating possibilities of coasting, tobogganing, skating, with ice-hockey, skiing, curling, and snow-shoeing. Indeed, so alluring and delightful are these winter sports that thousands of Englishmen and Frenchmen have got into the habit of going every winter, from their mild, but rather raw and sodden winter climate and evergreen turf to the high valleys of the Alps, the Engadine and Maloja, for the special purpose of coasting, skating, and skiing. So successful have these winter sports become that some of our New England and Adirondack summer resorts are taking courage to advertise themselves as open the year round for the keen and biting delights of winter pastimes.

In fact, a man who keeps himself in reasonable vigor and training can enjoy himself in the open air as heartily and as healthfully in even our sharp American winter as in any other season of the year. The rapidly growing habit of going back to the summer home, or down to the country for Christmas, while originally little better than an act of brainless Anglomania by our Smart

Set, has proved so exhilarating and refreshing that it now stands on its own merits and bids fair to become a national habit for city dwellers.

It cannot be too strongly insisted upon that these things are *not* luxuries—they are *necessaries!*—necessary to existence, necessary to vigor, necessary to endurance, necessary to effective work and to happiness in life. Play makes the boy a man, sports in the open air keep the man from becoming old, keep his muscles springy, his head clear, his eye bright, his arteries elastic, and his judgment and temper sound. It is perfectly true that certain men, especially those of tough and long-lived ancestry, appear to be able to do without exercise of any sort for years and turn out a large output of fairly effective head-work meanwhile. Their attitude is that of an eminent jurist, who dismissed two golfer friends, who were trying to infect him with the fever with a half-laughing, “Now, you boys run along and play and leave us men to our work!”

It is also true that other men, fascinated by the charm of outdoor sports, may pursue them with such vigor in the intervals of their serious pursuits as, so to speak, to burn their vital candle at both ends and die five or six years earlier than they might have on a less strenuous regimen. But there can be little question that the hard



worker at the desk or in the library would have done more work of better quality, with far greater happiness to himself and his fellows, if he had devoted a reasonable amount of time to blowing the cobwebs out of his brain and washing the toxins through his liver by active life in the open air. And the too enthusiastic devotee of field sports, even if he did shorten his life by half a decade, got more rational enjoyment and left a happier memory in his sixty or sixty-five years than he could by prolonging a gruel and chimney-corner, vegetable existence to seventy-five or eighty.

Any method of life which will carry a man happily and efficiently until sixty-five or seventy can drop him in the lap of Mother Earth as speedily and as suddenly as it likes after that. Indeed, the more suddenly the better, for a full life and a sudden death are the greatest favors granted by the gods.

---

## CHAPTER VI

### EXERCISE THAT RESTS

ONE of the oldest and truest of the Gallic gibes at the English was that they "took their pleasures sadly." *Mutamus coelum non animum* ("We change our skies but not our temper"), and if old Froissart could comment on this hybrid Anglo-Saxon civilization of ours he would need to change only one word—"we take our pleasures strenuously." What else could be expected of a nation, one dominant influence in the foundation of which had for its motto, "Satan finds some mischief still for idle hands to do?"

In such an atmosphere idleness has come to be regarded not merely as a negative fault, but as a positive crime. Not even the rich dare to be idle, but are driven by public opinion to a perpetual round of busy foolishness, to make themselves believe they are doing something. Play must always be apologized for.

We have eagerly accepted and practised the Gospel of Work, but ignored the Gospel of Rest—save by postponing it to a future life. Indeed,

any attempt to promulgate it in this world would have to reckon with the feeling that it was something almost immoral, and certainly against good public policy. Work, whether bodily or mental, is inherently virtuous and profitable, though occasionally dangerous in extremes. Rest, or to put it more frankly, idleness, is inherently immoral and injurious, though to be tolerated at times.

One of our latest would-be philosophers has even lamented the irksome and humiliating necessity of wasting one-third of our time in sleep; and our "chew-chew" friends propose to save half the time which we now waste in the coarse and unspiritual task of devouring our food. We have no time to live, nowadays, only to work.

A decided reaction has set in, however, against this "strive, never grudge the strain" attitude, not only from an esthetic and hedonistic point of view, but more emphatically from a physical and practical one. On the one hand, we are learning from stern practical experience that it does not pay to work either ourselves or others too hard or too incessantly, if we want a high quality of product.

On the other hand, our laboratory workers are piling up proof upon proof that all life, all activity, is emphatically rhythmic—a phase of activity

alternating with a phase of rest, both phases being absolutely necessary to its continuance. The more intense the activity of the positive stage, the longer and more profound the calm of the resting stage. They tell us emphatically that rest is **not** a mere breathing-space for recovery from action, a mere negative interval, but on the contrary a most positive one, during which are built up the energies which are to be expended in the next bout of work. In short, intelligent idleness is **not** only an important factor in success, but is as necessary as well-directed industry.

Take, for instance, such a classic illustration of incessant and unremitting activity as the heart. The "muffled drum" of its ceaseless beat has been one of the favorite metaphors for never-tiring, never-ceasing activity, work that cannot stop until death comes to its relief. Never will it rest save in the grave, we are dramatically assured. It is sad to destroy such poetic illusions, but to hold the stop-watch on this physiological little busy bee is to discover that, as a matter of fact, it is resting about thirteen hours out of each twenty-four. Even this eleven-hour day would, of course, disqualify it for joining any self-respecting labor union, but that is very different from its popular reputation of working twenty-four hours a day.

---

The beat of the heart is a series of explosions, like that of a gas-engine or an automobile-motor, and the period of rest (diastole) is a period in which fuel is accumulated and prepared in its muscle wall, just as gasoline-vapor and air are drawn into the cylinder of an automobile, to be used in the next explosion. Here, as elsewhere, periods of rest are really periods of concealed activity, and in one sense as much "work," and as important work, is done in our resting phases as in our working phases.

This is beautifully illustrated, in the case of the heart, in that as long as an abundant supply of fresh food-energy is brought to it by the blood, increasing the rapidity of its beat will, up to a certain limit, increase the work done. But this period has very definite limitations, and as soon as the rapid beating has continued for a moderate length of time, or the supply of fresh blood-fuel is interfered with, the rapidly beating heart begins to do less work than the slow one. The pulse of exhaustion and of weakness, for instance, is nearly always rapid, and the few drugs which will increase the work done by the heart are chiefly those which slow the beat and enable it to accumulate a reasonable amount of explosive force between its contractions.

Broadly speaking, the younger, the smaller, and

the weaker individuals are, the more rapid will be their pulses; while the stronger and the more vigorous, the slower, within certain limits. Though other influences are concerned in minor degree, it is significant in this connection that the child has a pulse of one hundred or more, the woman a pulse of eighty-five, and the grown man one of seventy.

Our forefathers stumbled upon a remarkably apt and significant word to express rest, or restful change of activity—"re-creation." For this is literally what is happening to our powers during apparent rest.

The other so-called incessant, or unceasing, activity of living bodies, breathing, is even more clearly and obviously rhythmic and alternating in character. We breathe about eighteen or twenty times a minute, and of the three or more seconds consumed in taking each breath a little more than forty-five per cent. suffices for the active work of expanding the chest and producing the partial vacuum into which the air rushes. The remaining time is taken up by the falling back of the chest-walls under the influence of gravity, in driving out the inspired air, and in resting before the next inspiration.

Of course all the open activities of the body, muscular and mental, undergo an eclipse of sleep

---

for at least eight hours of the twenty-four. But this is no longer regarded as merely a negative process, an interval for simple recovery from exhaustion. There are a score of physiologic facts to show that sleep is a positive process, a time of re-building, of re-charging of the body battery. Instead of its being analogous to death, it is during sleep that our bodies are more constructively and profitably alive—building up energy, accumulating capital to be spent recklessly during our waking hours. We save during sleep and spend when we are awake, and it is the latter which will bring us to bodily bankruptcy, not the former.

Another important, almost revolutionary change in the scientific attitude toward work has come from the study of the nature of fatigue. Formerly it was, not unnaturally, regarded as a literal exhaustion of strength, a burning or using up of all the store of energy or fuel in our muscles. Now, however, we know that fatigue is simply the result of a form of self-poisoning. We are being suffocated and paralyzed by our own waste products.

To take a very simple illustration, if the leg muscle of an anesthetized frog is stimulated by an electric current, after contracting rapidly and vigorously for some minutes its responses will gradually become slower and slower until they

cease altogether. The muscle, we say, is tired out. If, however, a current of normal saline solution (simple salt water) is driven through the muscle so as to wash it out thoroughly, and the electric stimulus is again applied, it will promptly begin contracting again. This process can be repeated several times without any fresh food-energy being supplied to the muscle, although the periods of work will become shorter and shorter with each application.

In short, fatigue is due to the clogging of the body-engine by its own ashes and clinkers. A practical proof of this in the human body is the restful and invigorating effect of skilful massaging after violent and prolonged exercise. Scarcely a football team will take the field for an important game without being accompanied by one or more masseurs whose duty it is thoroughly to knead and rub and stretch every muscle in the players' bodies at its close. This will be found to make all the difference between waking next morning stiff and sore and rising almost as fresh and supple as ever. The explanation of the process is simply that by vigorous kneading, rubbing, and shampooing, the muscles are assisted to empty themselves of the fatigue poisons, and, circulation at the same time being stimulated, these are carried away, to be burned up in the lungs,



exhaled through the skin, or washed out through the kidneys.

The well-known effects of a very hot bath in preventing soreness and stiffness after unusual or unaccustomed exercise or exposure are another case in point. Here the heat stimulates both the waste-burning changes and the activity of the circulation through the muscles, and washes them clean of their self-poisons.

It is even being suggested by physiologists of repute that this process of fatigue prevention may be carried a step farther, that by burning up or neutralizing these waste poisons not merely after, but during work itself, endurance may be greatly increased. The plan is simply to improve upon nature's great method of neutralizing these poisons by administering her own antidote, oxygen, in more concentrated form than it is contained in the air. Already Dr. Leonard Hill, a well-known English physiologist, has reported some remarkable improvements of endurance in long-distance running and other athletic feats, by allowing athletes to inhale pure oxygen at certain intervals from a flask carried with them. This is certainly much safer and much less objectionable than the prevailing method—which is far too common—of administering stimulants and narcotics in the last stages of endurance runs. As an ex-

champion bicycle-racer remarked to me recently, "The first two days of a six-day race are run on your training and food; the next two on your nerve; and the last two on champagne, cocaine, and other 'dopes.'"

This habit, by the way, is another illustration of the nature of fatigue. A drink of whiskey or a small dose of cocaine or morphine will promptly remove "that tired feeling," not by adding any new strength whatever, but simply by dulling our nerves to the sense of discomfort produced by the fatigue poisons and enabling us to stagger blindly on and use up more of our reserve energy. This is the chief secret of the danger of depending upon stimulants, so-called.

There is an actual protective effect and benefit in fatigue. The sensation acts as a buffer, as it were, between moderate degrees of depletion of energy and dangerous degrees of exhaustion. The sensation of being tired, in fact, is nature's danger signal or warning to halt, and serious trouble is ahead of you if you disregard it.

But nature has devised still another resource and safe-guard against the dangers of fatigue poisoning. It was discovered at an early day of our experiments upon fatigue that the blood of animals fatigued to the point of bodily exhaustion, if injected into healthy animals, promptly

produced symptoms of poisoning. Quite recently it was found that if these animals were allowed to recover from their fatigue, or the fatigue had not been pushed to such extreme degrees, and then some of that blood was injected into the veins of a partially fatigued animal, the latter, instead of being poisoned and further overloaded, was revived and stimulated thereby. This promptly raised the suspicion that the blood of the animal which had recovered from fatigue contained some antidote or antitoxin for the fatigue poison, and this has now been corroborated by a number of observations; the fatigue antitoxin, although we are still somewhat in doubt as to its process, nature, and composition, has been isolated from the blood of animals and injected into both exhausted animals and men with prompt and beneficial results.

This discovery lets in a flood of light upon the dark and perplexing problem which has so long troubled our physiological souls, of training and second wind. The well known phenomenon of getting your second wind used to be variously and unsatisfactorily explained by an increase in the size and vigor of the heart, of the depth of respirations and size of the lungs, of an adjustment of our muscles to working in an atmosphere of lower percentages of oxygen, etc. All of these

probably play some part in the accomplishment, but evidently the principal feat in it is that of training by repeated moderate strains and stresses of "cell bugs" of both our voluntary muscles and our heart to manufacture fatigue antitoxin at a more rapid rate so as to neutralize the fatigue poisons almost as fast as they are produced.

It also helps to explain further why the injurious effects of overstrain and overexhaustion are always so much greater and more likely to be permanent in individuals who have not been through a proper course of previous training for the event or the contest. Anyone who has watched a prize fight—in a moving picture show, of course—will have been profoundly struck with the astonishing powers of recuperation possessed by the fighters. The victory in a prize fight, of course, is determined quite as much by the ability to stand the tremendous and prolonged muscular strain of incessant movement with every muscle of your body, as it is to take punishment and stand pummelling. And it is most extraordinary to see not merely the vanquished but the victor in the twenty-five or thirty rounds literally staggering about the stage, half blind, deaf to the call of the referee, slugging and guarding steadily and mechanically like a man in a dream, so that the

knock-out blow comes simply as the finishing touch to a profound fatigue debauch, and the beaten man lies like one dead until the fatal "ten" has been counted by the referee.

You expect to see an ambulance, at least, if not a hearse, come to carry the remains away, yet within a few seconds the corpse raises its head, its seconds dash water over it, and pour whiskey down its throat. Within twenty minutes he has washed off the blood, put on his coat, and is walking smilingly, if sheepishly, down the aisle to meet the condolences of his friends.

But why does nature allow the body-engine to be clogged and "hot-boxed," as it were, in this apparently short-sighted and irrational way, long before it has really exhausted its steaming power? A moment's reflection will show us; and this brings us to the most important and practical point in our new conception of fatigue, which is that it is a *protective reaction* on the part of nature, one of her greatest and most important danger-signals. In other words, when you are tired it is physically time to quit; that is nature's five-o'clock whistle. To disregard it is as irrational as to crowd on all steam and forge ahead when there is a hot bearing or a screeching axle.

But, it will be objected at once, this may be all very well as a matter of pure theory, but it is im-

possible, almost absurd in practice. Here, however, comes in another important new discovery in regard to fatigue which makes the problem much simpler and brings it within reach of practical solution. This is that each particular organ or tissue makes its own fatigue-poison which is, while disabling to the particular organ or tissue which produces it, very much less so, and in some instances scarcely at all, to the rest of the body. This is why, within certain limits, change of activity rests us.

All life is, of course, chemical activity, and every change which takes place in our tissues involves the formation of chemical waste products which for the most part are poisonous. Whenever, for instance, unusual strain has been thrown upon the brain and the nervous system, there is an unusual accumulation of their special kind of waste-poison in the nerve-cells, and we become conscious of "brain-fag." Meanwhile, however, our hearts, our lungs, and the great mass of our muscles have been comparatively inactive, and their fatigue-poisons have consequently been formed no faster than they could be burned or washed away by the blood. Now if we shut up our books, or pull down our desk tops and go for a brisk walk, or to attend to some out-door business appointments, not only are our brain-cells given a

rest and an opportunity to recharge themselves, but by increasing both the rate and the vigor of our heart-beats large supplies of blood are driven to and through the brain-cells, thus burning up and neutralizing the brain fatigue-poisons or washing them away at a more rapid rate.

On the other hand, it must be remembered that this process is also self-limited, though not quite so sharply so. The muscle-cells are now loading themselves with waste-poisons, which will soon be poured into the blood faster than they can be burned up, so that instead of pure, nourishing blood being sent to the exhausted brain, another poison is simply being added to its embarrassments. Practically, if the exercise be too violent for the enfeebled muscles of the brain-worker, or too long continued, or if by prolonged confinement in a badly ventilated room all the tissues of the body have become clogged by waste, produced faster than it could be eliminated, then muscular exercise will often simply pile fresh waste-poisons upon an already smoldering fire and increase one's exhaustion instead of relieving it.

Many a fatigued and exhausted business man or over-worked house-mother or teacher would be much more benefited by an hour's rest or sleep in a well-ventilated room—if possible in the open air—than by a brisk two-mile walk. The best pos-

sible short vacation is often to sleep late, take one's breakfast in bed, and loaf industriously all the afternoon.

This self-poisoning and specific nature of fatigue explains, of course, why we so quickly become tired by doing exactly the same thing over and over again. The particular group of muscles and the brain- and nerve-cells which direct their action become swamped with their own fatigue-poisons. No matter how perfect our circulation may be, or how deep and full our breathing, we cannot pump enough blood through the artery supplying the muscle and the nerve involved to wash out and burn up these poisons as fast as they are formed. This is particularly true in children and accounts for what we frequently hear lamented by parents and teachers as their "restlessness" and "lack of persistence."

In our best and most intelligently planned schools now, the study period for one subject has been cut down in a most surprising manner, until the maximum for children under twelve years of age is in the neighborhood of fifteen minutes. This is precisely parallel with the method now adopted by trainers in the gymnasium for building up general vigor and a symmetrically developed set of muscles. Light dumb-bells and rapid movements have taken the place of heavy



weights and slow "heaving exercises." No one set of muscles is exercised for more than a few minutes, indeed, often a few seconds, at a time, and every practice period must stop just short of a sensation of fatigue.

But, objects someone at once, a ten-minute recitation period and a three-minute dumb-bell exercise are not like work at all, they are merely play. Precisely, that is the chief virtue of them; for *when we play we are imitating nature* and following her great method of development. All exercise, to do us good, *must* be play.

But this is equivalent to making mere enjoyment, pleasure, one of our chief guides in conduct! That is precisely what it is intended for and should be used as such, within reasonable limits. Pleasure is nature's stamp of approval. Like any other instinct or impulse, it may, if followed too blindly, lead to dangerous and harmful extremes, but within reasonable limits it is a legitimate and safe guide. No better illustration of both its value and its limitations can be given than the case of muscular exercise. When we come out into the glorious sunlight of a brisk October morning in the mountains, fresh from our night's rest and the bath, every sort of movement and exercise is a delight and an exhilaration to us. We are eager to run, jump, climb, wrestle, dance, even

shout and sing for the sheer joy of living. But follow any one of these delightful impulses for half or three-quarters of an hour steadily at the top of our pitch, and it quickly becomes, first monotonous, then fatiguing, and finally positively painful.

Pleasure, or the play instinct, has done its work and fulfilled its mission and now gives place to fatigue and the rest instinct. Both are wholesome and life-protecting in their proper time and place. Indeed, curiously enough even the pure abstract philosophers have come to the conclusion that pleasure is at bottom merely the sensation connected with those actions which are done easily, without friction, and with a sense of reserve power behind them; while pain is the sensation accompanying those that are done with a sense of effort, of strain and drag and an overtaking of the resources of the organism. Tasks which are easily within our strength are pleasant or at least tolerable; those beyond our strength are punishment.

So that whatever we may hold in the field of morals, in the field of exercise and physical training it is safe to say that if an action gives us pleasure, it does us good. When it begins to give us pain, to produce fatigue, in fact, it is usually doing us harm. Though in the world of work this sensation must often be disregarded for the stern-

est of reasons, yet in the world of play and of physical upbuilding its sway is absolute and its demands everywhere to be obeyed.

Now that we have grasped the underlying principles that control good exercise and helpful sport, their practical application need not long detain us. First and most fundamentally, no exercise of any sort, whether bodily or mental, whether work or play, should be persisted in to an extreme or marked degree of fatigue. In the case of work this may be necessary, indeed is sadly inevitable at times, but it should be done only in emergencies and not as a regular habit. The practice does not pay in the long run, either to employer or employee. In the first place, it is the quality of the work rather than the quantity of it that counts. In the second, it is a fact as firmly established as the law of gravitation, that the shorter the hours of labor in a factory or industry the larger the output per workman.

Men who are well rested, well fed, and clear headed will do more work in all ranks of life in eight hours than they will in ten, and in ten than in twelve. The secret of successful work, of real efficiency, is to keep oneself at the highest pitch of vigor and in the highest condition of efficiency during working hours, by intelligent rest and recreation between.

Every man, for instance, who is engaged in a sedentary indoor occupation ought to spend at least two hours a day in the open air in some light but brisk and enjoyable form of exercise—not merely as a concession to his laziness, as an act of self-indulgence of his lower nature, but as a means of increasing his efficiency during office-hours. If, however, one has worked and overstrained oneself until there is no play spirit left, then what is needed in the way of recreation—yes, of physical culture—is not exercise but rest. Much as we may deplore our system of vicarious athletic exercise—taken by simply going and watching two hired teams pull off a match instead of playing the game ourselves—it may often happen that for the brain-weary and slack-muscle business or professional man or clerk, his tissues saturated with nerve-poisons and the lung-poisons of foul indoor air, it is more wholesome to go out and sit for three hours in the open air in storm or sunshine, upon a hard bench, with no exercise save for his lungs and his arms in the congenial occupation of “rooting” than it would be to tire himself out by a long country walk, by an hour’s heavy work in a gymnasium, or even by exercise with an ax or a buck-saw, so often recommended by rural philosophers.

Let everyone begin with the form of exercise in the open air which is most agreeable and most attractive to him, and let him *always stop short of real fatigue*, at least the degree that is accompanied by any marked discomfort. A mild sensation of fatigue, especially toward bedtime or toward the end of the day, is rather agreeable than otherwise and is no sign that exercise has done any harm. It makes no difference how light and apparently trifling the exercise may be; so long as it keeps you pleasantly occupied out in the open air it is doing you good. It will, of course, usually be found that the appetite for exercise grows by what it feeds on, and that while you may begin with the lightest and laziest forms of outdoor sports, it will not be long before you begin insensibly to increase your range and your endurance.

But don't try to force the process. What you are after is not championship records, but health; not muscle-development, but heart-power and appetite; not specialization, but balance. Let your strength grow naturally, unconsciously, like everything else in nature, and in a few months you will be surprised at your own increase in vigor and endurance, not only in the open but in the office as well. If the outdoor sport that you follow, the exercise that you take, does not increase

the clearness of your head, the keenness of your appetite, and your zest for your life-work, there is something wrong with it. Either there is not enough of it, or you are taking it too strenuously.

All sport and exercise, to be of real benefit, should be in the open air. This is obvious when we remember that its chief value to the sedentary man or woman is in burning up the old, accumulated fatigue-poisons from nerves and lungs, as well as the new ones from muscular effort. Gymnasium work is at best only a substitute for real exercise, nature's kind, and a poor one at that, often little better than a fraud. It is of surprisingly little practical value for real health-building, first, because it has to be carried on indoors, in an atmosphere loaded with the vapor of perspiration and overheated breaths and decayed teeth. Most city gymnasiums smell to the nostrils of the mountain-born like a livery stable or a Turkish bath-house.

Then the work is so utterly uninteresting and unattractive that it will usually be carried on only from a sense of duty and in violent spurts of a few weeks at a stretch, which often do nearly as much harm as good. Again, exercise to be really useful, must be of the nature of play in its attractiveness. The chief value of the gymnasium is in balancing up unsymmetrical muscular development

in the young, under school or military discipline and skilled instructors (and even this can be done much better in the open air), and in enabling the athlete to get into that unnatural state of muscular hypertrophy known as "training." Even school gymnasia, while admirable in many respects, are a mere apology for abuses instead of a reform—an attempt to correct our present outrageous over-confinement indoors of school children by another kind of confinement mitigated by muscular exercise and music.

Let everyone play and exercise according to his or her age and humor, so long as it be done in the open air. For the young, nothing better could be imagined than the hundred and one running, racing, catching, and fighting games already invented by the wise mother-wit of the race. Let them play everything that comes with bat, with ball, with racket, hoop, top, marble; then they will be provided with resources for every state of the weather. There are not fifteen days out of each year in our North American climate in which some outdoor sport cannot be played by those who have once got the open-air habit.

For manhood and womanhood, the great battle-like team and "side" games, the rod and the rifle, the racket, the paddle and the snowshoe. For the dominant decades after forty-five, golf, the fishing

rod, the farm, the garden and the collecting **craze**. Golf is the ideal sport for sedentary men and women of any age, for it combines the maximum of interest with the minimum of effort.

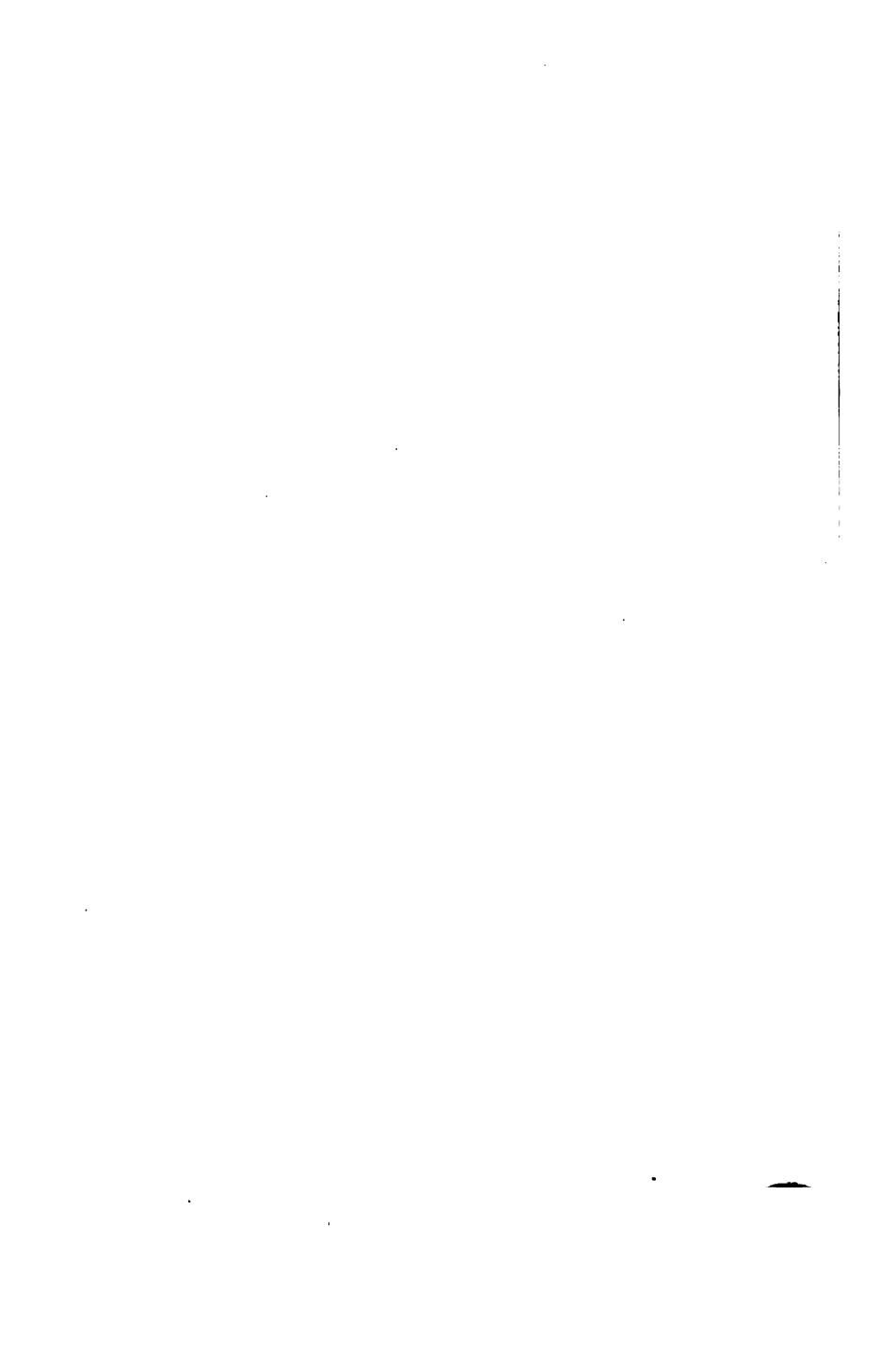
Above all, in starting your play, go slowly at first. Be as shamelessly lazy as you like for the first two to five days of your vacation. Be sure to get all the nerve-poisons and lung-poisons and germ-laden dust of the city out of your lungs and system before you begin to take any real exercise. Time so "wasted" will often save you from coming back to town with the feeling that your vacation has not done you much good.

**THE END**











# OUTING HANDBOOKS

---

Each book deals with a separate subject and deals with it thoroughly. If you want to know anything about Airedales an ~~OUTING~~ HANDBOOK gives you all you want. If it's Apple Growing, another ~~OUTING~~ HANDBOOK meets your need. The Fisherman, the Camper, the Poultry-raiser, the Automobilst, the Horseman, all varieties of outdoor enthusiasts, will find separate volumes for their separate interests. There is no waste space.

The series is based on the plan of one subject to a book and each book complete. The authors are experts. Each book has been specially prepared for this series and all are published in uniform style, flexible cloth binding, selling at the fixed price of seventy cents per copy.

Two hundred titles are projected. The series covers all phases of outdoor life, from bee-keeping to big game shooting. The books now ready or in preparation are described on the following pages:

**OUTING PUBLISHING COMPANY**

THE  
OUTING  
MAGAZINE

315 FIFTH AVENUE  
NEW YORK CITY

OUTING  
HANDBOOK

## Outing Handbooks

---

- The Airedale.** By William Haynes. This book opens with a short chapter on the origin and development of the Airedale as a distinctive breed. The author then takes up the problems of type as bearing on the selection of the dog, breeding, training and use. The book is designed for the non-professional dog fancier who wishes common sense advice which does not involve elaborate preparation or expenditure. Chapters are included on the care of the dog in the kennel and simple remedies for ordinary diseases.
- The Amateur Gunsmith.** Edited by Horace Kephart. Every man who owns a gun yields at some time or other to the temptation to take it apart. Usually he regrets having yielded to this temptation when it comes time to reassemble. This book is designed to aid the inquisitive and deft-fingered who do not care or are unable to turn the gun over to a professional gunsmith for repair. It is thirty years since anything of this sort appeared, and in that interval the local gunsmiths have practically passed out, leaving the gun user to depend entirely upon the experts of the large sporting goods dealers in the larger cities or the factory of the maker.
- The American Rifle.** By Charles Askins. The author has taken up in detail the various sporting rifles now in common use, and described their different advantages, with the maximum caliber and load for various game. An important feature is the discussion of trajectory and muzzle velocity as affecting range and accuracy. The book is designed especially with reference to the needs of the man who wishes to take up the use of the rifle or to find a new gun better adapted to the uses to which he wishes to put it.
- Apple Growing.** By M. C. Burritt. The objective point of this book is the home orchard with incidental reference to market possibilities. It deals with such matters as the kinds of apples best suited to certain localities, the location of the orchard and the soil qualities most to be desired, and the varieties that can be planted with a reasonable assurance of success. The whole problem of planting is dealt with thoroughly and also the care of the trees, and the harvesting and storage of the fruit.
- The Automobile.—Its Selection, Care and Use.** By Robert Sloss. This is a plain, practical discussion of the things that every man needs to know if he is to buy the right car and get the most out of it. The various details of operation and care are given in simple, intelligible terms. From it the car owner can easily learn the mechanism of his motor and the art of locating motor trouble, as well as how to use his car for the greatest pleasure. A chapter is included on building garages.
- Backwoods Surgery and Medicine.** By Charles Stuart Moody. A handy book for the prudent lover of the woods who doesn't expect to be ill but believes in being on the safe side. Common-sense methods for the treatment of the ordinary wounds and accidents are described—setting a broken limb, reducing a dislocation, caring for burns, cuts, etc. Practical remedies for camp diseases are recommended, as well as the ordinary indications of the most probable ailments. Includes a list of the necessary medical and surgical supplies.
- The manager of a mine in Nome, Alaska, writes as follows: "I have been on the trail for years (twelve in the Klondike and Alaska) and have always wanted just such a book as Dr. Moody's Backwoods Surgery and Medicine."*

## *Outing Handbooks.*

---

**The Beagle.** In this book emphasis will be laid on the use of the beagle in the hunting field rather than in the show ring. It is designed for the man who wishes to keep a small pack for his own enjoyment rather than for the large kennel owner. Simple remedies are prescribed and suggestions are given as to the best type for the purposes of purchase or breeding.

**Boat and Canoe Building.** Edited by Horace Kephart. It is not a difficult matter to build a boat or a canoe yourself. All that is necessary is to bring together knowledge, manual dexterity, and the proper material. The material can be secured almost anywhere at little expense. The manual dexterity will come with practice and this book furnishes the knowledge. All types of the smaller boats and canoes are dealt with and suggestions are given as to the building and equipping of the smaller sail boats.

**Camp Cookery.** By Horace Kephart. "The less a man carries in his pack, the more he must carry in his head," says Mr. Kephart. This book tells what a man should carry in both pack and head. Every step is traced—the selection of provisions and utensils, with the kind and quantity of each, the preparation of game, the building of fires the cooking of every conceivable kind of food that the camp outfit or woods, fields, or streams may provide—even to the making of desserts. Every precept is the result of hard practice and long experience. Every recipe has been carefully tested. It is the book for the man who wants to dine well and wholesomely, but in true wilderness fashion without reliance on grocery stores or elaborate camp outfits. It is adapted equally well to the trips of every length and to all conditions of climate, season or country; the best possible companion for one who wants to travel light and live well.

The chapter headings tell their own story:

Provisions.—Utensils.—Fires.—Dressing and Keeping Game and Fish.—Meat.—Game.—Fish and Shellfish.—Cured Meats, etc.—Eggs.—Breadstuffs and Cereals.—Vegetables.—Soups.—Beverages and Desserts.

*"Scores of new hints may be obtained by the house-keeper as well as the camper from Camp Cookery."*  
—Portland Oregonian.

*"I am inclined to think that the advice contained in Mr. Kephart's book is to be relied on. I had to stop reading his recipes for cooking wild fowl—they made me hungry."* —New York Herald.

*"The most useful and valuable book to the camper yet published."*—Grand Rapids Herald.

*"Camp Cookery is destined to be in the kit of every tent dweller in the country."*

—Edwin Markham in the San Francisco Examiner.

**Exercise and Health.** By Dr. Woods Hutchinson. Dr. Hutchinson takes the common-sense view that the greatest problem in exercise for most of us is to get enough of the right kind. The greatest error in exercise is not to take enough, and the greatest danger in athletics is in giving them up. The Chapter heads are illuminating: Errors in Exercise.—Exercise and the Heart.—Muscle Maketh Man.—The Danger of Stopping Athletics.—Exercise that Rests. It is written in a direct matter-of-fact manner with an avoidance of medical terms, and a strong emphasis on the rational, all-round manner of living that is best calculated to bring a man to a ripe old age with little illness or consciousness of bodily weakness.

---

## *Outing Handbooks*

---

**Farm Drainage and Irrigation.** One of the most serious farm problems is that connected with water, either its lack or its too great abundance. This book gives the simple proved facts as to the best methods for taking water off the land or bringing it on. It shows the farmer how to bring his swamps into cultivation without converting them into sun-dried wastes. Also how the sandy stretches may be kept moist and bearing through even the driest summer. A knowledge of these simple facts will relieve the farmer from the haunting fear of drought or the long rains that sometimes blight the spring in Northern and Eastern latitudes.

**The Farmer's Bees.** The keeping of bees is neither a difficult nor expensive matter, nor is it one in which a little knowledge is necessarily a dangerous thing. However, there are a few elementary facts which could be well learnt, such, for example, as the handling of swarms and the provision of proper honey-making food and the care of the bees in winter. This book covers this elementary field in a logical and convincing manner.

**The Farmer's Bookkeeper.** Half of the secret of success in farming is knowing the real relation between income and expenditure. In no business is that so hard to find probably, as in farming. Mr. Buffum has presented a simple, common-sense method of farm accounting which he has used with great success for many years. It requires no elaborate knowledge of bookkeeping and is entirely reliable in showing the farmer where his business stands as a going concern.

**The Farmer's Cattle.** In this volume the problem discussed is two-fold, one of breeding and the other of care. The breed is determined largely by the use to which the farmer wishes his cattle put, whether for dairy or beef purposes. Their care is affected to a certain extent by the same consideration but not so largely. For the average farmer a combination of the two is usually most desirable, and it is in this light that this book discusses the problem. All of the information is designed to avoid unnecessary expense and to save the farmer from rushing into extreme and costly experiments or wasting his time on valueless mongrel strains. The care of calves is discussed in length, as also the stabling and feeding of milk cows and the feeding of the stock destined for the market.

**The Farmer's Hogs.** It was once the boast of Illinois, then the biggest grain producing state of the Union, that 90 per cent. of the corn raised in that state was fed in the country of its origin. Probably 70 per cent. of that amount was fed to hogs. That condition still holds in a large measure. Hence this book is designed to aid the practical farmer in selecting the best hogs for market purposes as well as for home use, and to advise him as to their care and feeding so as to insure a living profit on their cost and the cost of the grain necessary to feed them for market.

**The Farmer's Poultry.** It is a proved fact that there is large profit to be made from the raising of poultry but not by the amateur who rushes into it without knowledge or experience. In this book is given the fruit of many years experience of a man who has made poultry raising pay. The birds dealt with are not the expensive exotics of the poultry fancier but the practical varieties with records as good producers and a good name in the market. The reader is taught how to provide shelter for his poultry that shall keep them comfortable and safe from vermin of all kinds without involving the builder in prohibitive expense. The objective point is poultry as a by-product of the Farm that shall provide amply for the farmer's needs with a margin for the market.



## Outing Handbooks

---

**The Farmer's Vegetable Garden.** This is designed especially for home growing with some reference, however, to the possibilities of market use of over supply. It gives the latest and best advice on the raising of the staple vegetables, such as potatoes, cabbages, beans, peas, turnips, and so forth. It also shows the farmer how, without material trouble or expense he may enrich his table with new varieties and lengthen the season of his garden's productiveness. It is a manual for the gardener who has only odd times to devote to his garden and its advice is intended to enable him to use that time to the highest advantage.

**Farm Planning.** It is a vexing problem with every practical farmer to get the greatest possible use out of his land with the least possible waste. A stony hillside is not suitable for the raising of wheat but it may furnish an excellent location for an orchard. A piece of swampy bottom land may not be ideal for barley but with proper drainage and cultivation it may be unexcelled for a vegetable garden. This book deals with just such problems and also with the placing of farm buildings, yards, and so forth, in order to make them fit in, so that the farm may be kept constantly at its highest pitch of usefulness.

**The Fine Art of Fishing.** By Samuel G. Camp. Combines the pleasure of catching fish with the gratification of following the sport in the most approved manner. The suggestions offered are helpful to beginner and expert anglers. The range of fish and fishing conditions covered is wide and includes such subjects as "Casting Fine and Far Off," "Strip-Casting for Bass," "Fishing for Mountain Trout," and "Autumn Fishing for Lake Trout." The book is pervaded with a spirit of love for the streamside and the out-doors generally which the genuine angler will appreciate. A companion book to "Fishing Kits and Equipment." The advice on outfitting so capably given in that book is supplemented in this later work by equally valuable information on how to use the equipment.

**Fishing Kits and Equipment.** By Samuel G. Camp. A complete guide to the angler buying a new outfit. Every detail of fishing kit of the freshwater angler is described, from rodtip to creel and clothing. Special emphasis is laid on outfitting for fly fishing, but full instruction is also given to the man who wants to catch pickerel, pike, muskellunge, lake-trout, bass and other fresh-water game fishes. Prices are quoted for all articles recommended and the approved method of selecting and testing the various rods, lines, leaders, etc., is described.

*"A complete guide to the angler buying a new outfit."*

*—Peoria Herald.*

*"The man advised by Mr. Camp will catch his fish."*

*—Seattle, P. I.*

*"Even the seasoned angler will read this book with profit."*—Chicago Tribune.

**The Horse, Its Breeding, Care and Use.** By David Buffum. Mr. Buffum takes up the common, every-day problems of the ordinary horse-user, such as feeding, shoeing, simple home remedies, breaking and the cure for various equine vices. An important chapter is that tracing the influx of Arabian blood into the English and American horses and its value and limitations. Chapters are included on draft-horses, carriage horses, and the development of the two-minute trotter. It is distinctly a sensible book for the sensible man who wishes to know how he can improve his horses and his horsemanship at the same time.

## *Outing Handbooks*

---

**Intensive Farming.** By L. C. Corbett. The problem as presented in this book is not so much that of producing results on a small scale because the land is no longer fertile enough to be handled in an expensive manner but rather one of producing a profit on high priced land, which is the real secret of intensive farming. This book will take up the question of the kind of crops, and method of planting and cultivation necessary to justify the high prices now being charged for farming land in many sections. Its publication marks the passing of the old style, wasteful farmer with his often destructive methods and the appearance of the new farming which means added farm profit and proper conservation of the soil's resources.

**Leather and Cloth Working.** Edited by Horace Kephart. This book is designed to give competent instruction in the making of the outdoor paraphernalia into which leather and cloth enter, such as tents, sails, sleeping bags, knapsacks, blanket rolls, and so forth. It has the double advantage of reducing the cost of the equipment and minimizing the risks of loss or accident when away from civilization. The cutting or patching of a sail or the repair of a sleeping bag may seem like a simple matter, but knowledge of how to do it may often spell the difference between safety and comfort or danger and a very high degree of discomfort.

**Making and Keeping Soils.** By David Buffum. This is intended for practical farmers, especially those who wish to operate on a comparatively small scale. The author gives the latest results as showing the possibility of bringing worn-out soil up to its highest point of productiveness and maintaining it there with the least possible expense. The problem of fertilization enters in as also that of crop rotation and the kind of crops best adapted to the different kinds of soil.

**The Motor Boat, Its Selection, Care and Use.** By H. W. Slauson. The intending purchaser of a motor boat is advised as to the type of boat best suited to his particular needs, the power required for the desired speeds, and the equipment necessary for the varying uses. The care of the engines receives special attention and chapters are included on the use of the boat in camping and cruising expeditions, its care through the winter, and its efficiency in the summer.

**Outdoor Signalling.** By Elbert Wells. Mr. Wells has perfected a method of signalling by means of wig-wag, light, smoke, or whistle which is as simple as it is effective. The fundamental principle can be learnt in ten minutes and its application is far easier than that of any other code now in use. It permits also the use of cipher and can be adapted to almost any imaginable conditions of weather, light, or topography.

**Planning the Country House.** The builder of a house in the country or in the suburbs is frequently forced to choose between two extremes—his own ignorance or the conventional stereotyped designs of mediocre architects and builders. This book provides a solution by presenting a number of excellent plans by an expert architect of wide experience in country house building, together with a plain statement of the problems which the builder must face, and the most suitable and advisable methods of solving them. A sufficient number of plans are presented for a liberal choice or to suggest the very house that the reader has been looking for.

## *Outing Handbooks*

---

**Rustic Carpentry.** Edited by Horace Kephart. Every year the number of dwellers in summer cottages of the smaller type increases and every year more and more people are giving attention to the beautifying of their own summer places with porch gates, fences, lawn seats, summer houses, and so forth. The country carpenter is not always available and frequently not dependable. This book answers the call for information as to how the owner of a summer house or summer cottage may be his own carpenter, building his own furniture, constructing his own porches, adorning his place with attractive fences, seats and so forth. Incidentally it opens the door to a most attractive way of spending one's leisure hours on a summer vacation.

**The Setter.** As the hunting dog "par excellence" the setter will only be treated with direct reference to his use before the guns. A practical method of putting a puppy through the necessary preliminary training before he takes the field, is described, as also the proper use of the broken dog in actual hunting or in field trials. As in our other dog books special attention will be given to the care of the dog in the kennels, type and qualities as affecting breeding, and simple remedies for the ordinary diseases.

**The Scottish and Irish Terriers.** By Williams Haynes. These two breeds are included in one book because of their general similarity of type, habits and use. Both have been increasing in popularity greatly in recent years. This book responds to a widely felt need for a common-sense manual which shall describe the breed, its noteworthy characteristics, points to be observed in selecting a dog, and the training of the dog after selection. Remedies for the ordinary diseases are described and advice given on the construction and care of kennels in a comprehensive and feasible manner.

**Sheet Metal Working.** Edited by Horace Kephart. Sheet metal enters into many of the articles that constitute an important part of the camper or canoeist's outfit such, for example, as baker's ovens, cups and pans, not to mention the numberless cans, boxes and cases which must find a place somewhere in the outdoor man's bags. This book teaches the reader how to obtain exactly the thing he wants because it teaches him how to make it himself. Also it is an excellent insurance against discomfort in the woods by its practical advice in the matter of rough and ready repair and refitting.

**Sporting Firearms.** By Horace Kephart. Mr. Kephart has done for the user of the shotgun, the rifle, or the revolver what he did for the camper and woods cruiser in "The Book of Camping and Woodcraft." All three arms are dealt with from the standpoint of the every-day non-professional user, and common-sense advice is given as to the makes, calibres, and types for the various uses. Even expert marksmen will find in this book possibilities of their favorite weapon suggested or described, of which they had not dreamt before.

**Tracks and Tracking.** By Josef Brunner. After twenty years of patient study and practical experience, Mr. Brunner can, from his intimate knowledge, speak with authority on this subject: "Tracks and Tracking" shows how to follow intelligently even the most intricate animal or bird tracks. It teaches how to interpret tracks of wild game and decipher the many tell-tale signs of the chase that would otherwise pass unnoticed. It proves how it is possible to tell from the footprints the name, sex, speed, direction, whether and how wounded, and many other things about wild animals and birds. All material has been gathered first hand.

### *Outing Handbooks*

---

**Wing and Trap-Shooting.** By Charles Askins. The only practical manual in existence dealing with wing shooting with the modern gun. It contains a full discussion of the various methods, such as snap-shooting, swing and half-swing, discusses the flight of birds with reference to the gunner's problem of lead and range and makes special application of the various points to the different birds commonly shot in this country. A chapter is included on trap shooting and the book closes with a forceful and common-sense presentation of the etiquette of the field.

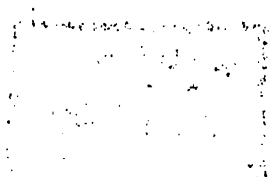
**OUTING PUBLISHING COMPANY**

THE  
OUTING  
MAGAZINE

315 FIFTH AVENUE  
NEW YORK CITY

OUTING  
HANDBOOKS





1914

12



3 2044 021 225 792

THE BORROWER WILL BE CHARGED  
AN OVERDUE FEE IF THIS BOOK IS  
NOT RETURNED TO THE LIBRARY ON  
OR BEFORE THE LAST DATE STAMPED  
BELOW. NON-RECEIPT OF OVERDUE  
NOTICES DOES NOT EXEMPT THE  
BORROWER FROM OVERDUE FEES.

